

REVISION OF MEXICAN AND CENTRAL AMERICAN SAURAUIA (DILLENACEAE)¹

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ABSTRACT

Two new species of *Saurauia* (*S. pustulata* and *S. squamifructa*) are reported among 22 recognized from Mexico and Central America. The species are divided into four taxonomic series based on the prominence of the tertiary veins of the leaves, the distribution of trichomes on the sepals and the pubescence of the ovary. Trichomes are recognized as useful for identifying species and a key to the various trichome types occurring in *Saurauia* is provided. The morphology of the versatile anthers of *Saurauia* is discussed. The dehiscence of the anthers is interpreted as basal and extrorse by rimiform pores. The similarities between *Saurauia* and the *Ericales*, especially the *Clethraceae*, are stressed.

The revision and morphological studies are based upon the study of herbarium specimens from 11 important herbaria. These include most of the type specimens as well as most of the specimens annotated by Buscalioni in an earlier revision from 1912-1927.

INTRODUCTION

Saurauia, a widespread tropical genus of flowering plants with about 65 species in the western hemisphere alone, is an important but puzzling element of the tropical American flora. Its distribution is continuous from central Mexico in the north to Chile in the south. Principally, the genus consists of localized populations of subalpine trees and shrubs, but species adapted to lower elevations and having rather broad distributions also are known.

The only revision of the American species of *Saurauia* (Buscalioni, 1912-1927) was completed before sufficient collections were available to show the geographical and natural relationship of the populations. In the mildest of criticisms directed at Buscalioni's revision by workers on tropical American floras, Macbride (1956, p. 678) observes that: "The most recent account of these strikingly attractive plants is lacking in organization and presentation, but one may admire the author's inherent ability and interest, which prompted his studies, probably under difficulties. In any case specific characters to this day are not understood. . . ."

In view of the fact that no contemporary taxonomic treatment of the American species of *Saurauia* has been generally acceptable to botanists, it has become urgent to restudy the specimens cited by Buscalioni, together with the many more recent collections. It is the hope of the writer to extend his studies to include the South American species in the near future.

Saurauia has been divided into a number of series based on the vestiture of the leaves (Buscalioni, 1912; Diels, 1922; Gilg & Werdermann, 1925). This has led to considerable confusion since descriptive terms generally applied to epidermal emergences have never been standardized. Terms have been carelessly used with subjective connotations and without adequately describing them. "Strigose," "seri-

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ceous," "villous," etc. may refer to a type of hair, on the one hand, or to a particular condition or aspect of hairiness, on the other. When the diminutive is used, the reader is uncertain whether it is being implied that the vestiture is less dense or whether the individual trichomes are smaller. More important is the fact that the hairiness of the leaves of American *Saurauia* often varies considerably from one population of a species to another. The Guatemalan population, called *S. veneficorum* by Standley & Steyermark (1947), is quite hairy and would certainly have been placed in his series *Strigosae* by Buscalioni; but *S. waldheimia* Busc., based on a nearly glabrous collection from Nicaragua, was included in his series *Oligotrichae*. The two are undoubtedly the same species; they both have the same type of reduced inflorescence, leaves conspicuously villous in the axils of the secondary veins, the same type of sepal vestiture and they both have pubescent ovaries, a rare feature in American *Saurauia*. Similar variability has been found in the pubescence of the leaves of *S. veraguasensis*, *S. selerorum* and *S. scabrida*.

In place of foliar pubescence, used primarily by Buscalioni to define his taxonomic sections and series, the combination of leaf venation, distributional patterns of sepal pubescence and the presence or absence of pubescence on the ovary have been emphasized. Nevertheless, the types of trichomes occurring on the various organs of the plants are useful in defining the species; therefore, a rather exhaustive treatment is given them in the following pages.

LIMITS OF VARIATION

Habit: The Mexican and Central American species of *Saurauia* are mostly small trees and shrubs. Two species, *S. laevigata* and *S. seibertii*, however, reach the respectable height of 75-100 feet. The leaves are frequently crowded at the ends of low, spreading, crooked branches. The straight hollowed stems of some of the shrubby species, notably, *S. veraguasensis* of Honduras, are used as blow-guns by the natives.

Leaves: The primary division of the key to the series is based on the venation of the leaves. In some species, the tertiary veins jut out from the lower surface of the blade and are more prominent than the lesser reticulum; in others they are immersed and scarcely distinguishable from the lesser reticulum. Only the highly variable *S. waldheimia*, which is easily identified by its pubescent ovary, has leaves which in some specimens fall into the former category and in other specimens fall into the latter. The leaves vary considerably in size from specimen to specimen in the same species. The smallest, 7-10 cm long, are found in a Guatemalan population of *S. waldheimia*. The largest, which may extend beyond the length of the standard herbarium sheet, are found in *S. scabrida*. While it may be said that in general the larger-leaved species of Mexican and Central American *Saurauia* are more hairy and the smaller-leaved species often more or less glabrous, there is considerable overlapping with regard to these two characters. The texture may vary from coriaceous to membranaceous. Leaf shape is so limited within the genus, narrowly elliptical to broadly obovate, and often so variable within the various species that it is of little use in delimiting species.

Inflorescences: That the inflorescence is a complicated phase of the branching of the shoot system is clearly demonstrated in the North American species of *Saurauia*. Following the pattern of the vegetative axis, branching in the inflorescence is spiral. This pattern continues to the ultimate branches. The bracts may be foliaceous, linear, triangular or subulate. Because the upper and smaller are irregular in their orientation, they are of little help in analysis; therefore, one must depend solely on the order of development of the flowers. If the ultimate divisions of many-flowered inflorescences are examined at early stages of development, the second orientation of buds along scorpioid axis can clearly be seen. Lower flowers along this axis are earlier in their development; thus, the ultimate division is a cincinnus. Although frequently described as a "panicle," the inflorescence of *Saurauia* is obviously a thyse composed of scorpioid cymes.

Flowers: Except for the usually tetramerous flowers of *S. laevigata*, flowers of *Saurauia* are normally pentamerous. Although stamen number may vary from as low as 13 in *S. conzattii* to as high as 52 in *S. rubiformis*, studies on an Asian *Saurauia* by Brown (1935) suggest that the androecium, too, is basically pentamerous. He noted that the initial stamen primordia in flowers of *S. subspinosa* appear as five mounds of tissue alternating with the petals. Occasional flowers may be found in which the imbricate sepal is partially fused with the adjacent outer sepal. Petals may show a similar fusion. The flowers of *S. leucocarpa* are highly variable, the floral whorls varying in number independently. Flowers from the same inflorescence of this species may have 4-6 sepals, 4-6 petals, and 3-5 carpels. The petals vary in color from white to pink, are fused at the base, more or less oblong to obovate, obtuse at the apex. The margins are entire or incised near the apex in one or more places.

Calyx: All pentamerous flowers of *Saurauia* are quincuncial in the aestivation of the sepals. Two sepals have their entire outer surfaces exposed in the bud; two sepals are almost entirely enclosed with a narrow triangular portion of their outer surface exposed. The fifth sepal is imbricate with about half its outer surface exposed and the other half covered in the bud. The outer sepals are usually ovate or elliptic in outline. More variable, the inner two sepals may be ovate, obovate, elliptic or nearly circular. The exposed half of the imbricate sepal is shaped like the outer sepals and the covered half is shaped like the inner; thus, it is generally asymmetrical. Tetramerous flowers have two outer opposed sepals enclosing, in the bud, two inner opposed sepals. As in the pentamerous flowers, the two inner sepals have a narrow triangular portion exposed in the bud. In both tetramerous and pentamerous flowers the two inner sepals and the imbricate sepal are slightly larger than the two outer.

The distribution of trichomes on the persistent sepals is a reliable and a convenient diagnostic feature of Mexican and Central American *Saurauia*. Some species have sepals which are glabrous over the entire inner surface of the sepals, other species have sepals pubescent over the entire inner surface, and yet another group of species have sepals only partially invested with pubescence. These three groups may be subdivided on the basis of the distribution of the vestiture on the outer surface of the sepals. The outer surface may be (1) glabrous, (2)

pubescent only on the parts exposed in the bud, (3) glabrous on the parts exposed in the bud and pubescent on the parts covered in the bud or (4) 2 kinds of pubescence may be present on the parts exposed in the bud and in this case the parts covered in the bud may be either glabrous or pubescent. The presence of stellate hairs near the articulation of the calyx makes further distinctions possible. Although the margins of the sepals of most species are ciliate, a few are not. In the keys and descriptions which follow, surface vestiture is described separately from marginal vestiture; thus, sepals may be described as both glabrous and ciliate.

The types of trichomes present on the sepals contribute further to classification of Mexican and Central American *Saurauia*. The emergences occurring on the inner surface and the outer surface covered in the bud are stellate types. These are also present on the outer surfaces exposed in the bud when the vestiture is mixed. In addition, hirsute, strigose and shaggy induments occur on the surfaces exposed in the bud.

Epidermal Emergences: One of the most striking features of many species of *Saurauia* is their extreme hairiness. The leaves, petioles, growing points, young branches and all parts of the inflorescence may be densely beset with trichomes. Some species, on the other hand, may be practically glabrous; nevertheless, trichomes of some sort occur on the vegetative and floral organs of all.

We may designate the different types of trichomes found in North American species of *Saurauia* as follows:

A. Unbranched hairs

a. Unicellular

1. Filiform—Filiform hairs consist of a single thin-walled cell. The longer ones become very flexuous (Fig. 1D).

b. Multicellular (both longitudinally and laterally)

2. Setose—The bristly setose hairs arise perpendicular to the epidermis. Tapering from a stout base, the weak ends of the longer setae are often bent over or broken in herbarium specimens, perhaps a result of pressing. On leaf surfaces where these trichomes occur, they range in size from mere bumps or warts to setae 2-3 mm long (Fig. 1B).

3. Hirsute—More slender than setose hairs, hirsute trichomes also arise more or less perpendicular to the epidermis, but, are less erect and somewhat flexuous.

4. Paleaceous—Even longer than hirsute trichomes, paleaceous indument is flattened toward the broad base, becoming circular in cross section toward the apex.

5. Strigose—Strigose hairs bend abruptly at the swollen base. The ends of these harsh trichomes are more or less appressed to the epidermis and usually directed toward the apex of the organ on which they occur (Fig. 1A).

6. Sericeous—Sericeous trichomes differ from the hirsute only in the fact that they lie more or less appressed to the surface. These, too, sometimes exceed 3 mm in length.

7. Loriform—The long flexuous tip of the loriform hair, which often becomes entangled with the ends of neighboring hairs, is the only feature which distinguishes it from the sericeous hair (Fig. 1C).

B. Branched hairs

c. Stellate and similar types

8. Stellate—Stellate hairs are sessile; the arms are slender, radiating in the form of a star (Fig. 1F).

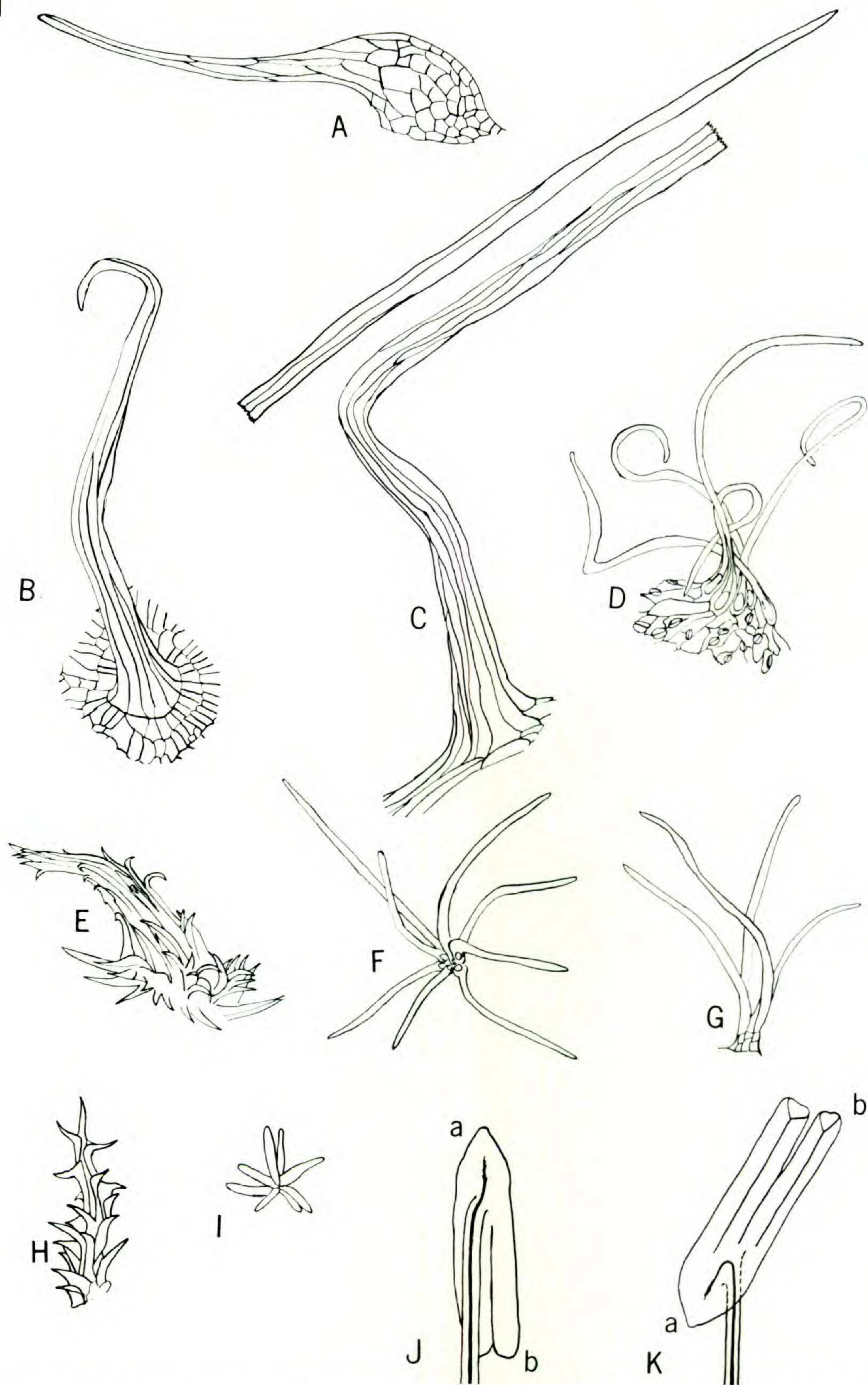


Fig. 1. Trichome types and stamens of *Saurauia*. A-D. Unbranched trichome types. A. Strigose hair on the secondary veins of the underside of the leaves, *Pringle 8201* (*S. leucocarpa*); B. Setose hair between the veins of the upperside of the leaves, *Pfeifer 1419* (*S. selerorum*); C. Loriform hair between the veins of the lower surface of the leaves, *Pfeifer 1419* (*S. selerorum*); D. Filiform hair in the axils of secondary veins of the lower surface of the leaves, *Bunting 361* (*S. serrata*). E-I. Branched trichome types. E. Tufted hairs of the secondary veins of the lower surface of leaves, *Mexia 9051* (*S. pringlei*); F. Stellate hair in the axils of the secondary veins of the lower surface of leaves, *Matuda 1198* (*S. leucocarpa*); G. Dendroid hair between the veins of the lower surface of leaves, *Allen 4663* (*S. veraguasensis*); H. Shaggy hair on the secondary veins of the lower surface of leaves, *Hunter 125* (*S. scabrada*); I. Radiate hair between the veins of the lower surface of leaves, *Allen 4671* (*S. rubiformis*). J-K. Stamen, adaxial view, showing vasculature (diagrammatic). J. In bud: a, apex of anther; b, base of anther. K. At anthesis: a, apex of anther; b, base of anther.

9. Radiate—Radiate hairs have sessile, frequently ovoid arms, less than 5 times longer than broad (Fig. 1I).
 10. Dendroid—The typical dendroid hair has a single multicellular stem; the unicellular flexuous branches radiate from the apex (Fig. 1G).
 - d. Clustered
 11. Clustered—Clustered hairs are sessile sheaf-like aggregations of cells which appear mound-shaped in surface view.
 - e. Shaggy
 12. Shaggy—The cells which make up the single stem of the shaggy hair are coherent for part of their length, but reflexed toward their apices, giving the trichome a branched appearance throughout its entire length (Fig. 1H).
 - f. Tufted
 13. Tufted—Tufted hairs are aggregations of cells, loosely coherent in the shape of an unbranched multicellular trichome. The loose ends of the outer cells are often directed away from the axis of the hair (Fig. 1E).
- C. Scales
- g. Fimbriate scales
 14. Fimbriate scales—Fimbriate scales have a thickened peltate body, with hyaline fimbriae, much longer than the body, confined to one edge and aligned in a single direction (Fig. 3H).

Often, in the axils of the secondary veins on the lower surface of some leaves, filiform and stellate types of indument become entangled in a mass or tuft of hairs. If the mass is thick and more or less wadded in appearance this condition is referred to as "cottony" without distinguishing the types of hairs involved. If the mass or tuft is merely tangled without appearing wadded, the condition is referred to as "villous." In all other cases, when describing the pubescence, the structural name of the trichome is used. The diminutive denotes trichomes of a shorter length—about 1 mm or less in unbranched multicellular types.

Frequently the tip of the cells of the surface layer of multicellular unbranched trichomes are reflexed, giving the hair a shaggy appearance. The prefix "shaggy," as in "shaggy-strigose," is used to indicate this condition. If the shagginess is confined to the base of the hair it is ignored.

The density of trichomes is qualified in the keys and descriptions as follows: "Densely" indicates that the trichomes are crowded, with little or no epidermis visible between them. "Abundantly" is used when the bases of hairs are separated by about half the length of individual hairs. "Sparingly" specifies that the bases are separated by about one to five times their length. "Scattered" trichomes are usually separated by many times their length and may occur at rather regular intervals. The lack of a modifier merely indicates that the trichomes named are present. The latter designation is useful when describing heterotrichous surfaces and surfaces on which trichomes are quite scattered.

The foliar trichomes are extremely variable. Stellate and dendroid types intergrade on the same leaf. Paleaceous indument is usually found with associated hirsute trichomes and intermediate types on the same blade. Loriform emergences on the lower surface of the leaves of Honduran populations of *S. selerorum* are replaced by sericeous hairs in other populations of the same species. Often the difference between two kinds of emergences appears to be merely a matter of vigor.

The foliar indument of some species, notably *S. zahlbruckneri*, *S. conzattii* and *S. pringlei*, is more or less deciduous. The absciss scars of the indument of *S. zahlbruckneri* are completely obscured by a heavy layer of cuticle, and the upper surface of older leaves appears glabrous.

No branched hairs, other than the tufted variety, and no unicellular hairs are found on the upper leaf lamina. Vestiture of this surface is usually more dense along the veins.

Stamens: The dehiscence of the anthers of *Saurauia* has been reported as either apical or basal. The two interpretations are a result of the peculiar reorientation of the anthers at anthesis. The end of the anther which is directed toward the base of the flower in the bud becomes directed away from the base as the flower opens, rotating 180° on the filament.

The course of the trace in stamens of *Saurauia* has been followed in serial sections and in cleared and stained whole mounts. As illustrated, before anthesis (Fig. 1J), the trace is continuous toward the embryonic apex of the anther. At anthesis (Fig. 1K), the trace becomes recurved in the reorientation of the anther. This is the reverse of what would be expected if the reorientation was merely a result of inflexion. The anther is interpreted as inverted at anthesis and the embryonic base of the anther must be interpreted as the morphological base. To be precise, one must speak of the dehiscence of the anthers as basal and extrorse by rimiform pores.

The versatile anthers fork in most cases about two-thirds the distance from the base. The point of attachment of the filament is at the junction of the two thecae of the anther. The anther occasionally becomes obcordate in the smaller-flowered species.

The degree of longitudinal dehiscence of the anthers has been held by some to be useful in delimiting species. I have found, to the contrary, that the dehiscence varies considerably from flower to flower in the same inflorescence and is probably dependent upon maturation.

Stamen number is relatively constant in some species, especially those with fewer stamens, and has been used as an aid in identifying specimens.

Pollen: Twenty samples of pollen from 15 species of Mexican and Central American *Saurauia* were examined from collections at the Missouri Botanical Garden and U.S. National Herbaria. Fifteen of the specimens examined had tricolporate pollen with no discernable surface ornamentation. Five of the specimens had much larger grains which were irregularly roughened. The irregularly roughened cells are not taxonomically significant, however, since two of the species in which they occur are also among the 15 specimens with tricolporate pollen. Erdtman (1952) found two different types of grains in the South American *S. brachybotrys*. The tricolporate type was found in Steinbach's Bolivian collection, 9513. The others, which he describes as "larger more or less irregular grains," from Steinbach's Bolivian collection (8920), are probably the same types as those found in my investigations. These irregularly roughened cells may represent a developmental phase of the pollen, possibly the pollen mother cells, or they may be the final phase of an abortive pollen.

No attempt has yet been made to compare critically the size of the pollen from different species. There are, however, no obvious size or structural differences.

Pistil: The ovary of Mexican and Central American species of *Saurauia* usually consists of 5 carpels. *Saurauia laevigata* is the only species which is normally 4-carpellate. The number of locules of the ovaries of *S. leucocarpa* flowers may vary from 3 to 5 in the same inflorescence. Placentation is axile, the placentas bearing numerous anatropous ovules with a single integument. Schnarf (1924) considers the hanging or descending placenta a significant departure from the ascending orientation of the ovules in most dilleniaceous genera.

The styles are filiform and free, each surmounted by a simple to capitate stigma. Some species frequently have flowers in which the pistils are aborted. Such flowers have been interpreted as unisexual, but this condition may be merely a matter of maturation. Brown (1935) has observed in the flowering pattern of *S. subspinosa*, an Asian species, that the ovary development lags behind the development of the anthers by about five days. Perhaps the small ovary lacking elongated styles may be a young stage in the ontogeny of the pistil which enlarges after the fall of the petals and the stamens.

The globose ovary is sulcate along the septa between the locules. It varies little in shape within the genus, but it does vary in size with the size of the flowers.

Saurauia veraguasensis, *S. squamifructa* and *S. waldheimia* have pubescent ovaries. The ovaries of the remaining species are glabrous. The wooly pubescence of the ovaries of the first two species is conspicuous at any stage of development; the vestiture of the ovaries of *S. waldheimia*, on the other hand, is often difficult to detect until the fruit has matured.

Fruit: The fruit of *Saurauia* is a berry filled with many small seeds embedded in a mucilaginous pulp. Although the size and vestiture of the fruit does vary from species to species, its characters are difficult to establish for taxonomic use since most specimens of *Saurauia* lack fruit. The seeds are areolate, about 1 mm long and about 0.5 mm wide. The testa is thin and fragile. The embryo is straight, extending about a third to a half the length of the seed and is embedded in endosperm.

GEOGRAPHY AND PALEOBOTANY

Saurauia species are found in the tropics of Asia and America. The number of species in Asia are more numerous (170) than in America (65). A similar disjunct distribution is known for many other genera of flowering plants and some authors have postulated a prior continuous distribution during the tertiary across a land bridge in the Bering Strait region. Paleobotanical evidence is inconclusive with regard to *Saurauia*. An impression of a *Saurauia* leaf was reported by Hollick (1936) in *The Tertiary Floras of Alaska*. His determination of the *Saurauia* specimen was apparently made from comparison with another paleobotanical specimen and not from comparison with collections of extant species of the genus. The photo of the specimen did not compare well with any *Saurauia* with which I am familiar. The tertiary veins which appear prominent in the photograph are perpendicular to the midrib of the leaf and the apex of the leaf is rounded. All species

of *Saurauia* which I have studied have leaves which are normally acute or acuminate at the apex. Five of the 22 Mexican and Central American species of *Saurauia* have leaves with the tertiary veins perpendicular to the midrib, but the veins are not prominent. I would hesitate to make a determination on the strength of a photograph and a description, but it seems very unlikely that the specimen in question represents a *Saurauia*.

Although paleobotanical evidence is inconclusive, it is quite possible that *Saurauia* may have lived in Europe during the tertiary. Hollick's citation of reported *Saurauia* impressions from Croatia raises great doubt as to the correct reference of this collection to *Saurauia*. On the other hand, the photograph (Langeron, 1900) of a collection from the tertiary of Sezanne, France, determined as *Saurauia roborans* Lang., is reminiscent of *S. tristyla* DC. as Langeron indicated in his discussion. Chandler's (1925) collection of seeds of *Actinidia* from the Eocene clays of Britain may well be *Saurauia* seeds instead; there is little difference between seeds of the two genera.

All of Gilg's (1893) taxonomic sections of *Saurauia* are known in the Old World. Only his sect. *Pleianthae*, is known in the New World. The greater speciation of tropical Asian *Saurauia* and the fact that the closely allied *Actinidia* is confined to that region suggest that the center of origin of *Saurauia* lies in the Old World. No species of *Saurauia* is known from the Antilles. Furthermore, the populations of North American *Saurauia*, for the most part, are confined to more or less contiguous mountain systems isolated from one another by lowland barriers. Smith (1941) notes a similar distribution for Papuan *Saurauia*.

There are three centers of concentration for Mexican and Central American *Saurauia* isolated from one another by lowland barriers. One, in Mexico, is limited in the north by frosts which occasionally penetrate south of the Tropic of Cancer and by the dry climate of the central Mexican highlands. To the south, this region is bounded by the Isthmus of Tehuantepec. A second region, including Chiapas, Guatemala, British Honduras, Honduras, El Salvador and Nicaragua, is bounded on the northwest by the Isthmus of Tehuantepec and on the southeast by Lago Nicaragua and the Rio San Juan valley. The third region, including Costa Rica and Panama, is bounded on the northwest by Lago Nicaragua and the Rio San Juan valley and on the southeast by the Isthmus of Panama. South American populations of *Saurauia*, except the lowland *S. laevigata*, are effectively isolated from the Mexican and Central American ones by the broadest of its lowland barriers, the Isthmus of Panama.

Only three species seem to have a more or less continuous distribution across the lowland barriers. *Saurauia laevigata* occurs in all three regions and spreads across the Isthmus of Panama into South America. *Saurauia aspera* is found from Oaxaca in region 1 to northeast Nicaragua in region 2. *Saurauia scabrida* is found in region 1 to east central Mexico and in region 2 into Honduras.

Region 2 with its rugged topography boasts the largest number of species, 18. Region 1 with a larger area but less rugged terrain and larger mountain systems has 10 species. Region 3 with less area and a more or less continuous chain of mountains has only 5 known species.

SYSTEMATIC POSITION

Systematists have generally referred *Saurauia* either to the *Guttiferales* or to the *Ericales*. Many have considered *Saurauia* transitional between the two. The two orders share with *Saurauia* a woody habit, axile placentation and regular, generally bisexual, frequently pentamerous flowers. If Corner's (1946) hypothesis that obdiplostemony has arisen from centrifugally developing androecia is correct, we find additional support for a relationship between the two orders through *Saurauia*. Furthermore, Erdtman (1952) has pointed out the similarities between the pollen of these groups.

Saurauia has many characters which identify it with the *Ericales*. It seems unnecessary to call attention to similarities in floral organization—superior ovary, epipetalous stamens with poricidal dehiscence of the anthers, frequent pentamery in the calyx and corolla lobes and axile placentas bearing numerous small anatropous ovules. Tetradinous pollen, frequent in the *Ericaceae*, is known for at least one species of *Saurauia* (Erdtman, 1952). An early ontogenetic inversion of the anthers occurs in *Erica* (Matthews & Taylor, 1927), similar to the late ontogenetic inversion of those of *Saurauia*. Multicellular trichomes similar to those found in *Saurauia* are frequent in ericaceous plants. Multilacunar nodal anatomy is known for both. Finally, each group is characteristically woody in habit and prefers mountainous habitats in the tropics.

It is my opinion that *Saurauia*, with its close allies *Actinidia* and *Clematoclethra*, should be referred to the *Clethraceae*. Flowers of both *Saurauia* and *Clethra* most frequently have five sepals and five basally fused petals; the aestivation of the sepals is quincuncial. The stamen number in *Saurauia* is sometimes reduced to 13 thus approaching the 10-staminate condition of *Clethra*. The tricarpellate pistil of *Clethra* corresponds to that of some Asian species of *Saurauia* and there is a tendency toward the fusion of the styles in Asian *Saurauia* which is nearly complete in many species of *Clethra*. An inversion of the anthers at anthesis, similar to that found in *Saurauia*, has been verified for *Clethra* by Thomas (1961). Similarities in the ontogeny and morphology of the ovules of *Saurauia*, *Actinidia*, *Clematoclethra* and *Clethra* were described by Lechner (1915) and Schnarf (1924). Finally, *Saurauia* shares with *Clethra* the following: unilacunar nodal anatomy, axile placentation, tricolporate unornamented pollen, numerous small seeds with straight embryos embedded in endosperm, a woody habit, mountainous tropical habitat and epipetalous stamens.

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SYSTEMATIC TREATMENT*

SAURAUIA Willd., Ges. Naturf. Fr. (Berlin) Neue Schr. **3**: 407, 1801. (Type: *S. excelsa* Willd.)

Scapha Noronha, Verh. Batav. Genoots. 5, ed. 1, Art. **4**: 3, 1770, nom. nud.

Palaua Ruiz & Pav., Fl. Peruv. Chil. Prodr. 100, 1794, non Cav. (1785). (Type: *P. lanceolata* Ruiz & Pav.)

Apetelia DC., Mém. Soc. Phys. Genève **1**: 426, 1821. (Based on *Palaua* Ruiz & Pav.)

Leucothea Moc. & Sessé ex DC., loc. cit. 419, nom. nud. pro syn.

Vanalphimia Lech. ex DC., loc. cit. 421, nom. nud. pro syn.

Marumia Reinw. ex Blume, Cat. Gew. Buitenz. 79, 1823. (Type: *M. cauliflora* Reinw. ex Blume)

Davya Moc. & Sessé ex DC., Prodr. **1**: 525, 1824, nom. nud. pro syn.

Reinwardtia Blume ex Nees, Syll. Ratisb. **1**: 96, 1824, non Dum. (1822). (Type: *R. javanica* Blume ex Nees)

Tonshia Buch.-Ham. ex D. Don, Prodr. Fl. Nep. 225, 1825. (Type: *T. polypetala* Buch.-Ham. ex D. Don)

Blumia Spreng. in L., Syst. Veg., ed. 16, **3**: 126, 1826. (Based on *Reinwardtia* Blume)

Overstratia Deschamps, Benn. Pl. Jav. Rar. 171, 1840, nom. nud.

Obelanthera Turcz., Bull. Soc. Nat. Moscou **20**, Partie 1: 148, 1847. (Type: *O. melastomacea* Turcz.)

Draytonia A. Gray, U. S. Expl. Exped. 1838-42 (Wilkes) **15**: 206, t. 15, 1854. (Type: *D. rubicunda* A. Gray)

Synarrhena F. Muell., Fragm. **5**: 175, 1866, nom. nud. pro syn.

Trematanthera F. Muell., Vict. Natural. **3**: 71, 1886. (Type: *T. dufaurii* F. Muell.)

Pubescent trees and shrubs. Leaves simple, spiral, petiolate, penninerved, estipulate. Inflorescences basically thyriform (sometimes reduced to a single flower in Asia), axillary. Flowers regular, basically pentamerous (S. laevigata usually tetramerous), pedicellate; sepals 3-6, often 5, persistent, the outer usually somewhat smaller and more densely pubescent, aestivation quincuncial; petals 3-6, usually 5, white or pink, fused at the base, falling as a unit with the stamens; stamens indefinite, the filament adnate to the base of the corolla, filiform, pubescent at the base, the anther bifurcate, versatile, extrorse, basally dehiscent by rimiform pores; ovary globose, 3- to 6-, frequently 5-locular and sulcate, the styles as many as the locules, free (sometimes coherent in Asia), filiform, obsolete to exceeding the stamens, the stigmata simple to capitate, the ovules indefinite, anatropous, the placentation axile. Fruit baccate, the seeds many, small, areolate, embedded in a mucilaginous pulp, the embryo straight, one-third to half as long as the seed, endosperm copious, mealy.

According to Gilg (1893), Willdenow consistently spelled *Saurauia* with an "i" in his own herbarium, not with a "j" as in the original description. The former

* Because of space limitations an alphabetical listing of exsiccatae has not been included in this paper, but a mimeographed copy is available from the author upon request.—Editor.

spelling is orthographically correct as indicated in the International Code to Botanical Nomenclature of 1961 (Art. 73: note 6 and examples).

KEY TO THE SERIES OF MEXICAN AND CENTRAL AMERICAN SAURAUIA

- a. Leaves with tertiary veins elevated, more prominent than the lesser reticulation (except sometimes *S. waldheimia*); plants often copiously pubescent.
 - b. Sepals densely pubescent, sometimes partly glabrous within, the margins obscured by the pubescence (see also *S. seibertii*); ovary and fruit glabrous I GYMNOGYNAE
 - bb. Inner and imbricate sepals partly glabrous, frequently completely glabrous within, ciliate.
 - c. Ovary and fruit pubescent II GYNOTRICHAE
 - cc. Ovary and fruit glabrous III OREOPHILAE
- aa. Leaves with tertiary veins immersed, scarcely more prominent than the lesser reticulation; plants sparingly pubescent; ovary and fruit glabrous IV LAEVIGATAE

SERIES I

GYMNOGYNAE Busc., *Malpighia* **25**: 221, 1912, emend.

Veranianae Busc., loc. cit. 219, pro parte.

Villosae Busc., loc. cit. 220, pro parte minore.

Basilatae Busc., loc. cit. 221, pro parte.

Scabrae Busc., loc. cit. 224, pro parte minore.

- a. Leaves chartaceous to coriaceous, pubescent above and beneath, usually wider than 6 cm, the secondary veins frequently more than 17 pairs.
 - b. Leaves abundantly sericeous above, smooth to the touch; trichomes of the leaves and sepals frequently longer than 1 mm; stamens less than 25. Mexico: Vera Cruz and northern Oaxaca 1. *S. villosa*
 - bb. Leaves sparingly pubescent above, usually scabrous; trichomes of the leaves and sepals rarely longer than 1 mm except along the major veins; stamens more than 25.
 - c. Leaves abundantly to scattered stellate, clustered and tufted beneath, not wrinkled or blistered above.
 - d. Inflorescence more than 70-flowered, flowers 9-13 mm in diam. Costa Rica 2. *S. pittieri*
 - dd. Inflorescence usually less than 60-flowered, flowers 15-22 mm in diam. Guatemala, Costa Rica and Panama 3. *S. rubiformis*
 - cc. Leaves densely stellate beneath, lacking other branched trichomes, cottony beside the major veins beneath, pubescent with multicellular unbranched hairs on the rugose to bullate upper surface. Mexico: Oaxaca and Chiapas 4. *S. comitis-rossei*
 - aa. Leaves membranaceous, pustulate, nearly glabrous above and beneath except the veins, 2-6 cm wide, the secondary veins 10-17 pairs. Mexico: Chiapas 5. *S. pustulata*

1. SAURAUIA VILLOSA DC., Mém. Soc. Phys. Genève **1**: 420, 1822. (ex icon.)

Leucothea villosa Moc. & Sessé ex DC., loc. cit., nom. nud. pro syn.

Davya villosa Moc. & Sessé ex DC., Prodr. **1**: 525, 1824, nom. nud. pro syn.

Obelanthera melastomacea Turcz., Bull. Soc. Nat. Moscou **20**, Partie 1: 148, 1847. (Type: Jürgensen 896)

Saurauia obelanthera Turcz., loc. cit. **30**, Partie 1: 245, 1858. (Type: Jürgensen 896)

S. pseudopeduncularis Busc., *Malpighia* **26**: 30, 1913. (Type: Jürgensen 896)

S. villosa DC. var. *hahni* Busc., loc. cit. 305. (Type: Hahn s.n.)

S. speluncicola Schultes, Bot. Mus. Leafl. Harvard Univ. **8**: 193, 1940. (Type: Schultes 795)

Shrubs to 2 m; copiously pubescent. *Leaf* blades obovate, acute to acuminate, the base acute to obtuse, frequently oblique, the margins setaceo-serrulate, 15-21

cm long, 4-13 cm wide, chartaceous, the secondary veins 15-21 pairs, the tertiary veins elevated, more prominent than the lesser reticulation, pustulate, abundantly sericeous with trichomes frequently longer than 1 mm between the veins above, usually abundantly dendroid to stellate between the veins beneath; petioles 1-7 cm long, 1-4 mm in diam. *Inflorescences* 7- to 62-flowered, 7-22 cm long, 1-7 cm wide, the primary peduncle 3-15 cm long, the bracts linear to triangular, 2-7 mm long or foliaceous, to 30 mm long. *Flowers* 15-20 mm broad, buds to 5-7 mm in diam, the pedicels to 3-10 mm long; sepals medially densely heterotrichous, laterally densely appressed-stellate, the imbricate sepal densely heterotrichous on the exterior half, densely appressed-stellate on the interior half, the outer 2 densely heterotrichous, all densely appressed-stellate within; petals 5, white, oblong to obovate, 7-9 mm long, 4-6 mm wide, obtuse to incised at the apex; stamens 20-24, the anther 2.0-3.0 mm long, the filament 2.0-3.0 mm long; ovary 5-locular, globose, 5-sulcate, glabrous, the styles 5, obsolete to 3 mm, the stigmas simple to sub-capitate. *Berries* to 7 mm in diam, globose, 5-sulcate, glabrous.

Damp forests, hillsides, thickets, along brooks, limestone cliffs with water continually dripping on plants, temperate mountain regions; 900-1000 m; flowering from May to September.

Vernacular names: *Pipicho*, *Mameyito* (Oaxaco—Schultes).

MEXICO: OAXACA: Cuicatlán, *Conzatti* 2498 (F); San Antonio Eloxochitlán, *Schultes & Reko* 235 (GH); *Schultes* 795 (GH); Sierra San Pedro Nolasco, Talea de Castro [Dist. Villa Alta], *Jürgensen* 896 (K); Yotao, *Galeotti* 7057 (F). VERA CRUZ: Jalapa, *Schiede & Deppe* 328 (HAL); Misantla, *Hahn s.n.* (F, P); Orizaba, *Botteri* 1126 (A, F, GH, MO); nr Orizaba, *Bourgeau* 3041 (P), *Mohr s.n.* (US), *s.n.* (US); Zacualpan, *Purpus* 1958 (F, GH, MO, US), 8005 (A), 8521 (A), 10765 (A, MO, US).

The Jürgensen collection differs from the others by lacking the rather dense stellate pilosity of the lower surface of the leaf. Buscalioni (1913) treated this collection as distinct and referred all Vera Cruz collections to *S. villosa* var. *hahni*. They are treated as one population here because of their geographical propinquity and their similarities in the long unbranched multicellular pubescence of the sepals and the upper surface of the leaves.

2. SAURAUIA PITTIERI Donn. Sm., Bot. Gaz. **23**: 237, 1897. (Type: *Pittier* 10163)

S. pseudopittieri Busc. f. *veranii* Busc., Malpighia **30**: 98, 1927. (Type: *Pittier* 13205, Donn. Sm. Pl. Guat. 7523)

S. pittieri f. *veranii* Busc., loc. cit. 210. (Type: *Tonduz* 12431, Donn. Sm. Pl. Guat. 7372)

Shrubs and trees to 8 m; copiously pubescent. *Leaf* blades obovate to elliptic, acuminate to acute, rarely obtuse, the base acute to obtuse, sometimes oblique, the margins serrulate, 18-31 cm long, 10-15 cm wide, chartaceous, the secondary veins 21-27 pairs, the tertiary veins elevated, more prominent than the lesser reticulation, scabrous with trichomes usually shorter than 1 mm between the veins above, abundantly to sparingly clustered and tufted between the veins beneath; petioles 1-5 cm long, 3-4 mm in diam. *Inflorescences* 75- to 430-flowered, 20-45 cm long, 6-15 cm wide, the primary peduncle 12-22 cm long, the bracts linear to linear-triangular, 2-15 mm long. *Flowers* 9-13 mm broad, buds to 5 mm in diam, the

pedicels 1-11 mm long; sepals 5, sometimes 4, 4-6 mm long, 3-4 mm wide, the pubescence shorter than 1 mm, the inner 2 medially densely heterotrichous, laterally densely clustered-pubescent, the imbricate sepal densely heterotrichous on the exterior half, densely clustered-pubescent on the interior half, the outer 2 densely heterotrichous, all densely clustered within; petals 5, sometimes 4, oblong to elliptic, white, 5-6 mm long, ca 2-3 mm wide, obtuse to emarginate; stamens 28-30, the anther 2.0-3.0 mm long, the filament 2 mm long; ovary usually 5-locular, globose, usually 5-sulcate, glabrous, the styles usually 5, obsolete, the stigmas simple. Mature berries not seen.

North slope, along road, forest, edge of forest; 1500-1750 m; flowering from June to September.

COSTA RICA: CARTAGO: S of Cartago, *Chrysler 5441* (F); V. Turrialba, *Pittier 13205*, Donn. Sm. Pl. Guat. 7523 (GH, US); Vara Blanca, *Skutch 3307* (MO, US). SAN JOSÉ: La Palma, *Pittier 10163* (NY, US); route de La Palma, *Tonduz 12431*, Donn. Sm. Pl. Guat. 7372 (GH, NY, US).

Saurauia pittieri intergrades morphologically with *S. laevigata* in Costa Rica. Specimens intermediate between the two prompted Buscalioni (1927) to recognize a third species, which he called *S. pseudopittieri*. By restudying the material annotated by him, I have been able to recognize other intermediate specimens. *Pittier 13205* with leaves like *S. laevigata* and flowers like *S. pittieri* is cited under the latter. *Tonduz 11452* with foliar pubescence intermediate between the two and flowers like the former is cited under *S. laevigata*. The disposition is made primarily on the basis of whether the flowers are 4- or 5-merous.

3. SAURAUIA RUBIFORMIS Vatke, *Linnaea* **40**: 221, 1876. (Type: *Hoffmann 814*)

S. sarapiquensis Carr., *Rev. Hort.* (Paris) **49**: 60, 1877. (ex char.)

S. polyantha Gilg in Engler & Prantl, *Natürl. Pflanzenfam.* III. **6**: 128, fig. 67, 1893. (ex icon.)

S. rubiformis f. *veranii* Busc., *Malpighia* **27**: 144, 1916. (Type: *Pittier 312*)

S. rubiformis f. *aspera* Busc., loc. cit. 145. (Type: *Tonduz 12422*, Donn. Sm. Pl. Guat. 7373)

S. pseudorubiformis Busc., loc. cit. 149. (Type: *Pittier 13202*, Donn. Sm. Pl. Guat. 7524)

S. pseudorubiformis var. *guatemalensis* Busc., loc. cit. 155. (Type: *Türckheim II778*, Donn. Sm. Pl. Guat. 8498)

Shrubs and multiple-trunked trees to 15 m; copiously pubescent. *Leaf* blades broadly to narrowly obovate to elliptic, shortly acuminate to acute, rarely obtuse, the base obtuse, rarely acute or cordate, the margins serrulate, 13-30 cm long, 5-16 cm wide, chartaceous to subcoriaceous, rarely membranaceous, the secondary veins 15-25 pairs, the tertiary veins elevated, more prominent than the lesser reticulation, scabrous with trichomes usually shorter than 1 mm between the veins above, sparingly to abundantly tufted-, clustered- or stellate-pubescent between the veins beneath; petioles ca 1.5-7.0 cm long, 2-4 mm in diam. *Inflorescences* 15 to 55-, rarely 190-flowered, 15-25, rarely to 33 cm long, 4-10, rarely to 18 cm wide, the primary peduncle 5-16 cm long, the bracts linear, triangular to foliaceous, 2-30 mm long. *Flowers* 15-30 mm broad, buds to 5-8 mm in diam, the pedicels 3-25 mm long; sepals 5, 4-8 mm long, 4-6 mm wide, the pubescence usually shorter

than 1 mm, the inner 2 medially densely heterotrichous, laterally densely clustered, the imbricate sepal densely heterotrichous on the exterior half, densely clustered on the interior half, the outer 2 densely heterotrichous, all densely clustered within; petals 5, white, oblong, 6-12 mm long, 3-7 mm wide, obtuse to incised at the apex; stamens 26-41, the anther 2-3 mm long, the filament 2-3 mm long; ovary 5-locular, globose, 5-sulcate, glabrous, the styles 5, obsolete to 4 mm, the stigmas simple. Mature fruit not seen.

Humid forests, second growth tropical rain forest, near streams; 1550-2600 m; flowering throughout the year.

GUATEMALA: ALTA VERAPAZ: region of Chelac, *Standley* 70369 (F); Chicoyonity, *Smith* 1719 (US); Cobán, *Türckheim* II778, Donn. Sm. Pl. Guat. 8498 (F, NY, US); region of Cocolá, *Standley* 70291 (F); Pansamalá *Türckheim* 990 (GH, NY, US); Senahú, *Hatch & Wilson* 197 (F). QUICHÉ: Nebaj, *Skutch* 1774 (A).

COSTA RICA: ALAJUELA: Topesco, *Smith* 2680 (F). CARTAGO: Oapellades, *León* 541 (F); V. Poas, *Pittier* 312 (US), *Tonduz* 10845 (US); V. Turrialba, *Pittier* 13202, Donn. Sm. Pl. Guat. 7524 (GH, US); along cart-road from Vara Blanca, *Maxon & Harvey* 8470 (US); Vara Blanca de Sarapiquí, *Skutch* 3504 (A, MO, US); Santa Cruz, *Holm & Iltis* 123 (F, MO); Zarcero, *Smith* A295 (F, MO), A707 (F, MO). SAN JOSÉ: Las Nubes, *Valerio* 1452 (F); La Palma, *Tonduz* 12422, Donn. Sm. Pl. Guat. 7373 (F, GH, NY, US); Potreros, *Dodge & Thomas* 4950 (GH, MO, US); Vara Blanca, *Chrysler* 5123 (F). WITHOUT PRECISE LOCALITY: Candelaria, *Hoffmann* 814 (US); Terraba, *León* 1101 (US); Zapote de S. Carlos, *Smith* H550 (F, MO).

PANAMA: CHIRIQUÍ: Casita Alta, *Woodson et al.* 957 (MO); nr Cerro Punta, *Stern & Chambers* 84 (US); Chiriquí, *Allen* 4797 (MO); Quebrada Velo, *Allen* 4671 (F, MO), *Woodson & Schery* 263 (MO, US).

This species, *S. pittieri* and *S. seibertii* are closely allied. They are similar in the distribution of the pubescence of the sepals and in the kinds of trichomes, including clustered and tufted types, making up the pubescence of both sepals and leaves. *Saurauia rubiformis* may be distinguished from *S. pittieri* by its larger flowers and from *S. seibertii* by its larger, more densely pubescent leaves.

4. SAURAUIA COMITIS-ROSSEI Schultes, Bot. Mus. Leaflet. Harvard Univ. **16**: 112, 1953. (Type: *Reko* 6183)

Trees to 5 m; copiously pubescent. Leaf blades narrowly elliptic to obovate, acute, the base obtuse to acute, frequently oblique, the margins setaceous-serrulate, 13-31 cm long, 4-11 cm wide, chartaceous to subcoriaceous, the secondary veins 20-23 pairs, the tertiary veins elevated, more prominent than the lesser reticulation, abundantly pubescent with multicellular unbranched hairs on the rugose to bullate surface between the veins above, densely dendroid and stellate between and cottony bordering the veins beneath; petioles 3-4 cm long, 2-4 mm in diam. Inflorescences 33- to 44-flowered, 10-15 cm long, 3-8 cm wide, the primary peduncle 5-10 cm long, the bracts linear to triangular, 1-10 mm long. Flowers 15 mm broad, buds to 4-5 mm in diam, the pedicels to 3-15 mm wide, the inner 2 medially densely heterotrichous, laterally densely radiate, the imbricate sepal densely heterotrichous on the exterior half, densely radiate on the interior half, the outer 2 densely heterotrichous, all submarginally radiate within; petals 5, sometimes 6, white, 6-8 mm long, 3-4 mm wide, obtuse to incised at the apex; stamens 31-40, the anther 2 mm long, the filament 3 mm long; ovary 5-locular, globose, 5-sulcate, glabrous, the

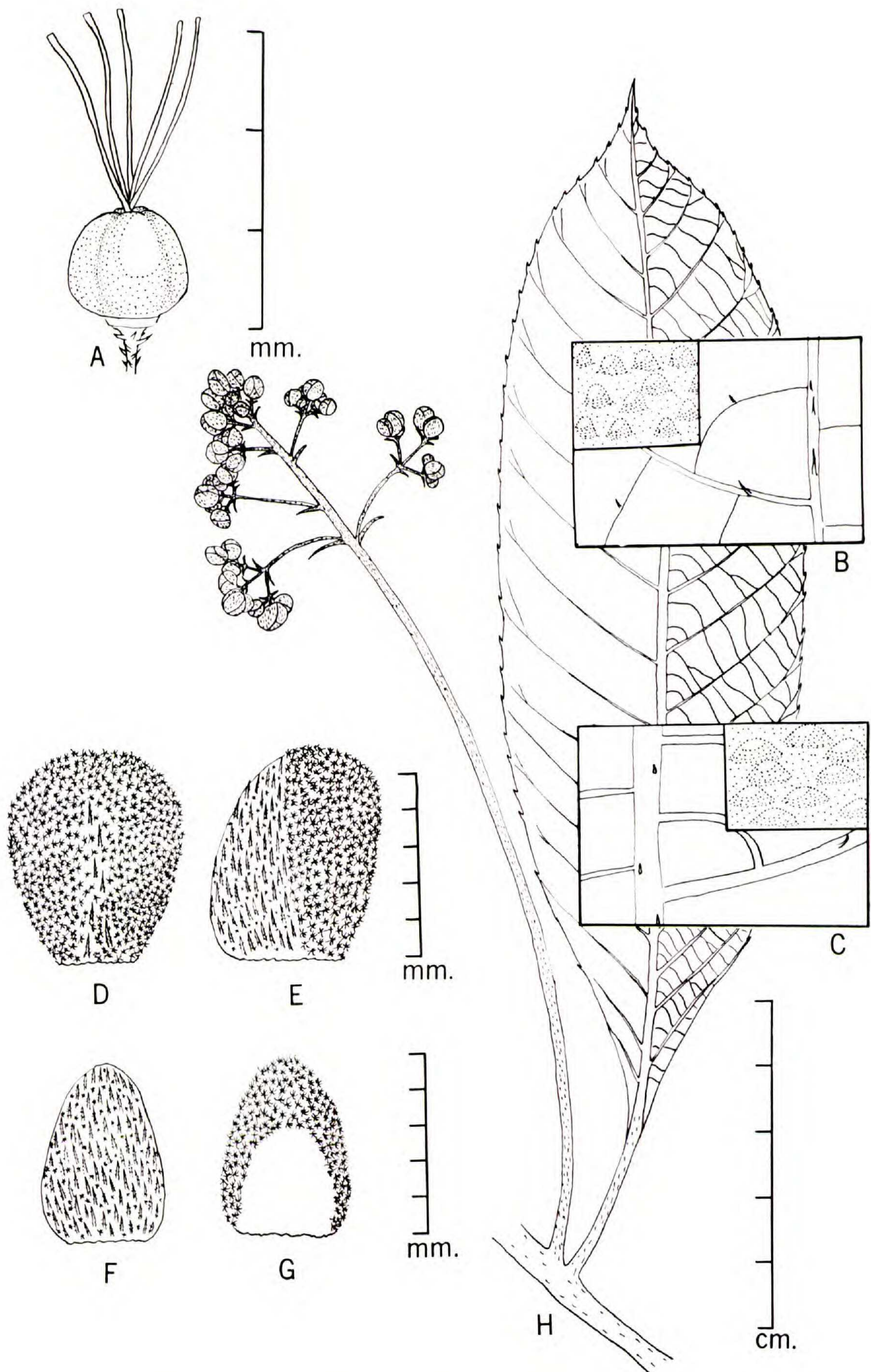


Fig. 2. *S. pustulata*. A. Ovary; B. Upper leaf surface (inset—pustulate epidermis); C. Lower leaf surface (inset—pustulate epidermis); D. Inner sepal, outer surface; E. Imbricate sepal, outer surface; F. Outer sepal, outer surface; G. Outer sepal, inner surface; H. Leaf and inflorescence.

4-5 styles obsolete to 4 mm long, the stigmas simple to subcapitate. *Berries* 5-6 mm in diam, globose, 5-sulcate, glabrous.

Open oak-pine forest; 1700-2000 m; flowering December to April.

Vernacular name: *Mameyito* (Oaxaca—Reko).

MEXICO: CHIAPAS: 10 km S of Ciudad de Las Casas, *Little & Sharp* 9979 (MICH); Paraje of Koltol Té, Municipio of Tenejapa, *Breedlove* 6152 (US). OAXACA: 184 km S of Oaxaca, *Carlson* 2713 (F); Pochutla, *Reko* 6183 (GH, NY).

The inflorescences of *S. comitis-rossei* and *S. pustulata* are invested with the same kind of pubescence. The two species are distinguished by marked differences in foliar pubescence and texture.

5. SAURAUIA PUSTULATA G. E. Hunter, sp. nov.

Frutices vel arbores ramulis dense strigillosis. *Foliorum* lamina anguste elliptica vel anguste obovata acuminata basi cuneata margine serrulata 8-19 cm longa 2-6 cm lata membranacea nervis secundariis 10-17 paribus nervis tertiariis quam reticulo minore prominentioribus pustulata vix strigillosa in utraque pagina; petiolus 1-2 cm longus 1-2 mm latus sparse strigillosus. *Inflorescentia* 30- vel 50-flora 8-19 cm longa 3-5 cm lata pedunculo primario 5-15 cm longo dense strigilloso atque dense radiato-piloso bracteis linearibus vel triangularibus 1-5 mm longis. *Flores* 12 mm lati pedicellis 2-4 mm longis dense hirtellis atque radiato-pilosis; sepala 5 ca 5 mm longa 3-4 mm lata extus 2 interiora medio dense strigillosa atque radiato-pilosa 1 imbricatum dimidia parte exteriori dense strigillosum atque radiato-pilosum interiore dense radiato-pilosum 2 exteriora dense strigillosa atque radiato-pilosa intus omnia submargine radiato-pilosa aliter glabra; petala 5 obovata vel oblonga 5-6 mm longa 2-3 mm lata; stamina 30 anthera 2 mm longa filamentum 2 mm longo; ovarium globosum glabrum loculis 5; styli 5 liberi ca 2 mm longi stigmatibus simplicibus. *Fructus* ignotus.

Shady forest, along brook, mountains; flowering in May and June.

MEXICO: CHIAPAS: Fenia, *Purpus* 10333 (NY, US, holotype); Lobani [Líbano?], *Liebmann* 373 (F).

SERIES II

GYNOTRICHAE Busc., *Malpighia* **25**: 220, 1912, emend.

Barbigerae Busc., loc. cit. 223, pro parte minore.

- a. Leaves frequently longer than 15 cm; usually stellate-pubescent beneath, the tertiary veins elevated, more prominent than the lesser reticulation, ovary and fruit densely pubescent; sepals distinctly heterotrichous without, partly glabrous without and within.
 - b. Inflorescence 7- to 94-, usually more than 12-flowered; ovary densely pubescent with filiform hairs. Honduras, Costa Rica and Panama6. *S. veraguasensis*
 - bb. Inflorescence 1- to 5-flowered; ovary densely pubescent with fimbriate scales. Honduras7. *S. squamifruca*
- aa. Leaves rarely longer than 15 cm, pubescent only with unbranched multicellular hairs, except the villous-barbate axils of the secondary veins beneath, the tertiary veins more frequently immersed, scarcely more prominent than the lesser reticulation; sepals primarily homotrichous with unbranched multicellular hairs, partly glabrous without, glabrous within; inflorescence 1- to 11-flowered; ovary and fruit abundantly to scattered pubescent with filiform hairs (nearly glabrous in Honduras). Guatemala, Honduras and Nicaragua8. *S. waldheimia*

6. SAURAUIA VERAGUASENSIS Seem., Bot. Voy. Herald 249, 1854. (Type: Seemann 1235)

- S. montana* Seem., loc. cit. 87. (Type: Seemann 1235)
S. costaricensis Donn. Sm., Bot. Gaz. **23**: 236, 1897. (Type: Cooper 304, Donn. Sm. Pl. Guat. 5714)
S. ovalifolia Donn. Sm. loc. cit. **42**: 292, 1906. (Type: Donn. Sm. Pl. Guat. 4746)
S. pseudoscabrida Busc., Malpighia **25**: 10, 1912. (Type: Donn. Sm. Pl. Guat. 4745)
S. costaricensis var. *brachitricha* Busc., loc. cit. **27**: 12, 1915. (Type: Tonduz 1744)
S. costaricensis var. *dolicotricha* Busc., loc. cit. 15. (Type: Tonduz 11690)
S. pseudocostaricensis Busc., loc. cit. 25. (Type: Donn. Sm. Pl. Guat. 4745)
S. pseudovaraguensis Busc., loc. cit. 30. (Type: Seemann 1235)
S. engleriana Busc., loc. cit. 131, 1916. (Type: Pittier 56)
S. setosa Standl., Field Mus. Publ. Bot. **18**: 693, 1937. (Type: Standley & Valerio 51979)

Shrubs and trees to 15 m; copiously pubescent. *Leaf* blades narrowly elliptic to obovate, acute to acuminate, the base obtuse to acute, frequently oblique, the margins setaceo-serrulate to serrate, 11-40 cm long, 3-18 cm wide, chartaceous to subcoriaceous, the secondary veins 14-26 pairs, the tertiary veins elevated, more prominent than the lesser reticulation, sparingly to abundantly strigillose, sericeous, setulose or hirtellous between the veins above, usually stellate or dendroid between the veins beneath, the axils of the secondary veins frequently villous-barbate beneath; petioles 1-9 cm long, 2-4 mm in diam. *Inflorescences* 7- to 94-flowered, 7-30 cm long, 3-18 cm wide, the primary peduncle 4-10 cm long, the bracts foliaceous or linear to triangular, 1-50 mm long. *Flowers* 13-27 mm broad, buds to 5-8 mm in diam, the pedicels to 3-10 mm long; sepals 5, 4-7 mm long, 3-7 mm wide, the inner 2 medially densely heterotrichous, laterally appressed-stellate, submarginally glabrous, ciliate, the imbricate sepal densely heterotrichous on the exterior half, appressed-stellate, submarginally glabrous, ciliate on the interior half, the outer 2 densely heterotrichous, all submarginally appressed-stellate, glabrous elsewhere within; petals 5, white to pinkish, oblong to obovate, 7-11 mm long, 4-9 mm wide, obtuse to incised at the apex; stamens 23-48, the anther 1.5-2.5 mm long, the filament 1.5-3.0 mm long; ovary 5-locular, globose, densely pubescent with filiform trichomes, the styles 5, obsolete to 4 mm long, the stigmas simple to subcapitate. *Berries* 6-10 mm in diam, globose, densely pubescent with filiform trichomes.

Cloud forest, rain forest, open sunlight, brushy stream bank, edge of forest, pastures, open semitropical valleys, wet rocky thicket, rocky woody stream bank; 640-2300 m; flowering throughout the year.

Vernacular names: *Capulín* (Honduras—Molina); *Cerbatana*, *Confiti*, *Moco* (Honduras—von Hagen); *Moquito* (Costa Rica—Standley & Torres); *Nance* (Costa Rica—Standley).

HONDURAS: COMAYAGUA: above the plains of Siguatepeque, *Yuncker et al.* 6263 (F, GH, MO). EL PARAISO: Manzaragua, *Williams & Molina* 11485 (F, GH, MO). MORAZÁN: region of Agua Amarilla, above El Zamorano, *Standley et al.* 5084 (F); along Quebrada El Gallo above El Jicarito, *Standley* 22481 (F); region of El Jicarito, above El Zamorano, *Molina* 796 (F, GH), *Standley* 24216 (F); Quebrada el Horno, entre el Frijolar y Tabla Granda, *Molina* 832 (F); nr Joya Grande, on road from El Zamorano to Suyapa, *Standley & Molina* 4430 (F); Montaña Zanquin, *Molina* 2962 (F, GH). YORO: Portillo Grande, *von Hagen & von*

Hagen 1037 (F, NY); *Subirana, von Hagen & von Hagen 1088* (F, NY), *1097* (F, NY). TEGUCIGALPA: *Tegucigalpa, von Hagen & von Hagen 1190* (F, NY).

COSTA RICA: ALAJUELA: *San Ramón, Brenes 1619a* (NY), *4060* (F, NY), *5352* (F, NY), *20477* (F, NY), *21907* (F, NY), *Tonduz 17676* (F, K, US). CARTAGO: *Agua Caliente del Llano, Brenes s.n.* (NY); *Atirro, Smith 6446* (GH, US); *Cartago, Cooper 304*, Donn. Sm. Pl. Guat. *5714* (F, GH, US); *Cerro de La Carpintera, Standley 35729* (US); *Copey, Tonduz 11690* (F, GH, NY, US), *11899* (US), *12205* (US); *Dulce Nombre, Standley 35935* (US); *La Estrella, Standley 39321* (US); *El Muñeco, S of Navarro, Standley 33547* (US), *Standley & Torres 50912* (US), *51273* (US); *Navarro, Smith 4746* (GH, US); nr *Tres Ríos, Williams 16138* (F); region of *Zarcero, Smith A398* (F, MO). HEREDIA: nr *Cariblanco, Williams 16422* (F); *Cerro de las Caricias, N of San Isidro, Standley & Valerio 51970* (F, US), *51979* (F, US), *51994* (US); *Los Angeles de Heredia, Brenes 1920* (NY); *Yerba Buena, NE of San Isidro, Standley & Valerio 49905* (US), *49935* (US). SAN JOSÉ: *Alajuelita, Smith 4745* (US); *Cerro de Piedra Blanca, above Escasú, Standley 32488* (F, US); vic of *El General, Skutch 2651* (GH, MO, US), *3814* (A, MO, US); *La Hondura, Standley 36127* (US), *36537* (US), *37598* (F, US), *Standley & Valerio 51890* (F, US); *Las Nubes, Standley 38355* (US); vic of *Santa María de Dota, Standley 41602* (US), *Standley & Valerio 44063* (US), *44069* (US), *44114* (US); ca 7 km N of *Santa María de Dota, Standley 42947* (US). WITHOUT PRECISE LOCALITY: *La Cruz de Alajuelita, Solis 386* (F, MO); *Naranjo, Oersted 359* (F), *375* (F); *Montes de Oca, Echeverria 539* (F); *San Marcos, Tonduz 7685* (US); *Río Segundo, Tonduz 1744* (US); *Río Torres a San Francisco de Guadalupe, Pittier & Tonduz 8959* (US), *Pittier 13020* (US); *Turrialba, Pittier 56* (BR); *La Ventolera, S slope of the V. Poás, Standley 34593* (US).

PANAMA: CHIRIQUÍ: *Bajo Chorro, Boquete District, Davidson 190* (A, F, MO); vic of *Bajo Mona & Quebrada Chiquero, Woodson & Schery 521* (GH, MO, US); trail from *Bambito to Cerro Punta, Allen 314* (A, F, GH, MO, US); vic of *Boquete, Allen 4650* (MO), *Bro. Maurice 698* (GH, US), *Maxon 4932* (US), *Pittier 2874* (F, US), *2942* (F, US); V. Chiriquí, *Boquete District, Davidson 979* (A, F, MO, US), *Seemann 1235* (K); *Cerro Horqueta, Boquete region, von Hagen & von Hagen 2052* (MO); vic of *Monte Lirio, valley of upper Río Chiriquí Viejo, Seibert 303* (F, MO); *Río Chiriquí Viejo valley, betw El Volcán & Cerro Punta, White 3* (F, GH, MO); *valley of upper Río Chiriquí Viejo, White 24* (MO); *Río Chiriquí Viejo valley, nr El Volcán, White 188* (MO, US); *Casita Alta, V. Chiriquí, Woodson et al. 809* (A, F, MO); vic of "New Switzerland," central valley *Río Chiriquí Viejo, Allen 1356* (GH, MO, US).

The broad range of variability manifested by the numerous collections of this species may account for the long synonymy. Specimens have most often been identified as *S. costaricensis*, probably because of J. Donnell Smith's numerous collections in Costa Rica and because Buscalioni never accepted the name *S. veraguasensis*; he published a new name, *S. pseudoveraguensis*, citing only Seemann's type collection. The most recent name, *S. setosa*, is based on plants with multicellular unbranched hairs much longer and more erect than usual. In all other respects these plants fall within the range of morphological variation of the species.

7. SAURAUIA **SQUAMIFRUCTA** G. E. Hunter, sp. nov.

Frutices vel arbores ramulis dense sericeis. Foliorum lamina anguste elliptica vel obovata acuminata basi cuneata margine serrulata 9-22 cm longa 3-6 cm lata chartacea nervis secundariis 15-24 paribus nervis tertiariis quam reticulo minore prominentioribus supra in parenchymate dense strigillosa setulosa nervatione dense sericeo vel strigilloso infra in parenchymate stellato-dendroideo-pilosa nervatione dense sericeo stellato-piloso ac in axillis costae villosa-barbata; petiolus ca 1-3 cm longus ca 1-2 mm latus dense sericeus vel hirsutus atque stellato-pilosus. Inflorescentia 1- vel 5-flora 3-9 cm longa 2-7 cm lata pedunculo primario 2-6 cm

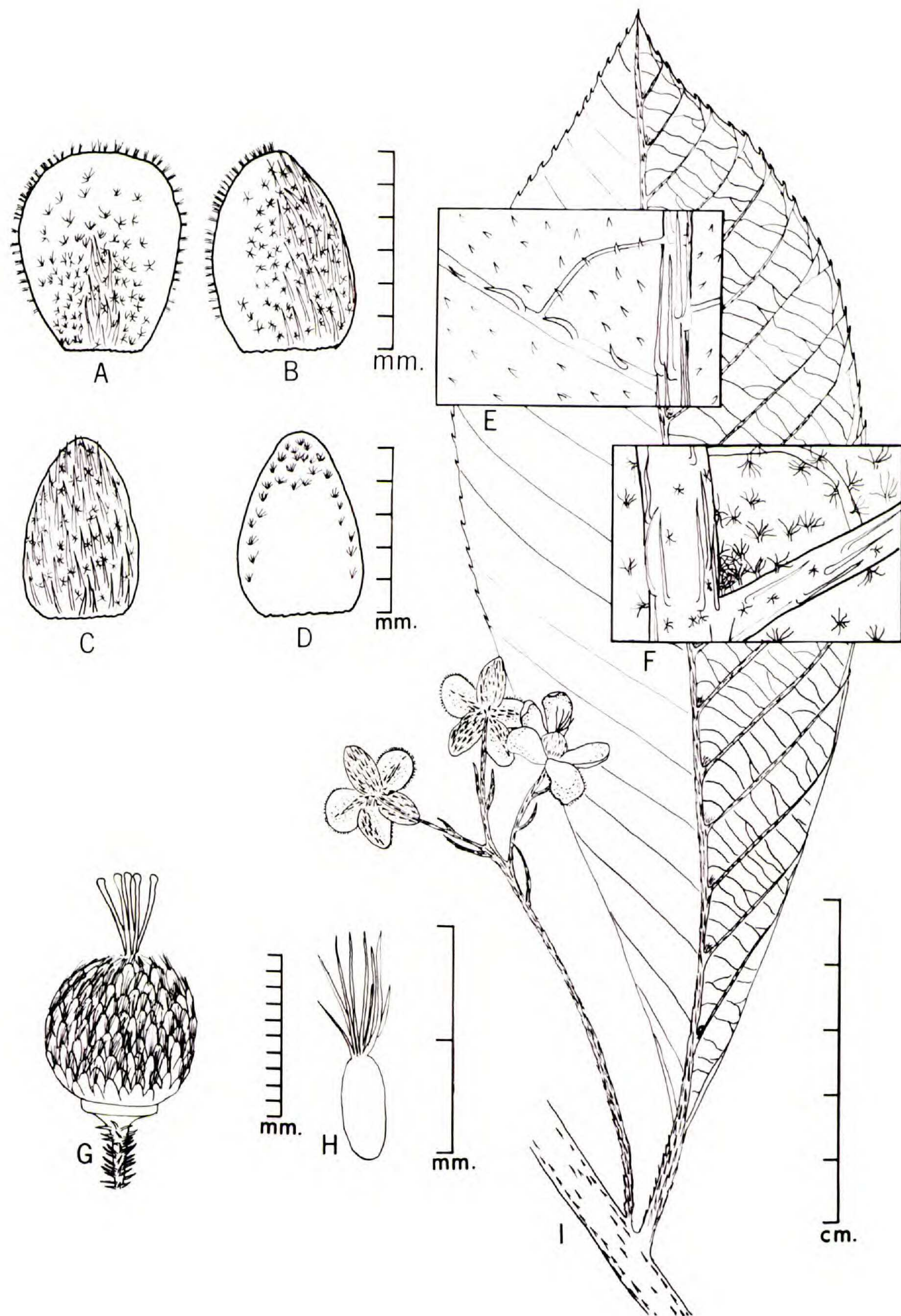


Fig. 3. *S. squamifructa*. A. Inner sepal, outer surface; B. Imbricate sepal, outer surface; C. Outer sepal, outer surface; D. Outer sepal, inner surface; E. Upper leaf surface; F. Lower leaf surface; G. Fruit; H. Fimbriate scale of the fruit; I. Leaf and inflorescence bearing young fruit.

longo dense sericeo vel hirsuto atque stellato-piloso bracteis linearibus vel lineari-triangularibus 3-15 mm longis. Flores ca 22 mm lati pedicellis 5-25 mm longis dense hirsutis vel hirtellis atque stellato-pilosis; sepala 5 ca 8 mm longa ca 5-6 mm lata extus 2 interiora medio dense hirtella atque stellato-pilosa submargine glabra ciliata 1 imbricatum dimidia parte exteriori dense hirtellum atque stellato-pilosum interiore stellato-pilosum submargine glabrum ciliatum 2 exteriora dense hirtella atque stellato-pilosa intus omnia submargine stellato-pilosa aliter glabra; petala 5 obovata vel oblonga ca 10 mm longa 7 mm lata; stamina 22 anthera 3.5-4.0 mm longa filamentum 2.5 mm longum; ovarium globosum dense fimbriato-squamo-pilosum loculis 5; styli 5 liberi ca 4 mm longi stigmatibus capitatis. Fructus globosus 8-13 mm latus dense fimbriato-squamo-pilosus.

Open slopes, forest on valley floor, barranca; 1050-2000 m; flowering from November to April.

HONDURAS: COMAYAGUA: Barranco Trincheras, Allen 6208 (F, US); Williams & Molina 18047 (F, US); Valibrea, Valerio 2747 (F); INTIBUCÁ: Sierra Opalaca, Pela Nariz, Hawkes, Hjerting & Lester 2105 (F, holotype). MORAZÁN: Rosario Mone, San Juancito, Williams 17406 (F).

8. SAURAUIA WALDHEIMIA Busc., Malpighia **28**: 488, 1920. (Type: Rothschuh 389, photo MO)

S. veneficorum Standl. & Steyerl., Field Mus. Publ. Bot. **23**: 217, 1947. (Type: Steyermark 31081)

Shrubs or small trees to 8 m, sparingly to copiously pubescent. *Leaf* blades narrowly elliptic to obovate, acuminate, rarely obtuse, the base acute, rarely obtuse, the margins serrulate, 4-17 cm long, 1-6 cm wide, membranaceous to chartaceous, the secondary veins 8-16 pairs, the tertiary veins elevated to immersed, glabrous to abundantly pubescent with only multicellular unbranched hairs between the veins above and beneath except the villous-barbate axils of the secondary veins beneath; petioles 0.5-2.0 cm long, 0.5-1.5 mm in diam, flattened to canaliculate above. *Inflorescences* 1- to 11-flowered, 3-9 cm long, 1-5 cm wide, the primary peduncle 1-5 cm long, the bracts foliaceous or linear, 2-15 mm long. *Flowers* 12-18 mm broad, buds to 4-7 mm in diam, the pedicels to 5-20 mm long; sepals 5, 4-5 mm long, 4-6 mm wide, primarily homotrichous with unbranched multicellular hairs, sometimes also appressed-stellate, the inner 2 medially densely to sparingly pubescent, laterally glabrous, ciliate, the imbricate sepal densely to sparingly pubescent on the exterior half, glabrous on the interior half, ciliate, the outer 2 densely to sparingly pubescent, sometimes also appressed-stellate, all glabrous within; petals 5, white, oblong to obovate, 7-8 mm long, 4-6 mm wide, obtuse to incised at the apex; stamens 21-24, the anther 2.0-2.5 mm long, the filament 2-3 mm long; ovary 5-locular, globose, 5-sulcate, abundantly to sparingly pubescent with filiform trichomes, the styles 5, obsolete to 2 mm, the stigmas simple to capitate. *Berries* 8-10 mm in diam, globose, 5-sulcate, abundantly to scattered filiform, nearly glabrous in Honduran plants.

Oak forest, oak-pine forest, cloud forest, moist thicket, ravine, near watercourse,

by road, upper slopes, along river; 500-2500 m; flowering from October to February.

GUATEMALA: CHIQUIMULA: SE of Concepción de las Minas, *Steyermark* 31044 (F), 31081 (F); 3-5 mi N of Jocotán, *Steyermark* 31626 (F, US). ZACAPA: bordering quebrada Alejandria, summit of Sierra de las Minas, *Steyermark* 29913 (F); bordering Río Lima, Sierra de Las Minas, *Steyermark* 30045 (F); along Río Repollal Sierra de Las Minas, *Steyermark* 42526 (A, F, NY), 42547 (A, F, NY, US); upper reaches of Río Sitio Nuevo, *Steyermark* 43231 (F).

EL SALVADOR: SANTA ANA: Cerro Montecristo, *Allen & Severen* 7126 (F, NY, US).

HONDURAS: EL PARAÍSO: Mt Yuscarán, *Molina* 621 (F). MORAZÁN: betw La Labranza & Las Flores, *Molina* 1301 (F, GH, MO); along trail from Las Flores to La Labranza, *Standley* 13440 (F); Mt Uyuca, *Standley & Molina* 4251 (F), *Williams & Molina* 11919 (F, GH, MO), *Williams & Williams* 18623A (US).

NICARAGUA: JINOTEGA: Jinotega, *Grant* 7300 (A, F), 7326 (A, F); nr Santa María, *Hawkes et al.* 2201 (F). WITHOUT PRECISE LOCALITY: in monte Pantasma, *Oersted* 360 (F).

Saurauia waldheimia is the only species that deviates significantly in the character of leaf venation on which the primary dichotomy of the key to the series is based. Specimens of two concentrations of this species, one in the Sierra de las Minas of Guatemala and the other in Nicaragua, characteristically have the tertiary veins of the leaves immersed. To the south of the Sierra de las Minas in Guatemala and extending into El Salvador, plants have leaves in which the tertiary veins are conspicuously elevated. Specimens from Honduras are intermediate in this character. Leaf size and the length and density of the multicellular unbranched hairs also are highly variable. The most dependable characters for identifying this species are the distribution of the pubescence of the sepals, the presence of filiform hairs on the ovary and the villous-barbate axils of the secondary veins on the underside of the leaves.

SERIES III

OREOPHILAE Busc., *Malpighia* **25**: 219, 1912, emend.

Mesophyllae Busc., loc. cit. 218, pro parte.

Villosae Busc., loc. cit. 220, pro parte.

Gymnogynae Busc., loc. cit. 221, pro parte.

Basilatae Busc., loc. cit., pro parte minore.

Barbigerae Busc., loc. cit. 223, pro parte.

Laevigatae Busc., loc. cit. 224, pro parte minore.

- a. Leaves heterotrichous beneath with multicellular unbranched and stellate or filiform trichomes (sometimes only the young leaves stellate or filiform in *S. zahlbruckneri* and *S. oreophila*).
- b. Leaves usually abundantly setulose, rarely tuberculate or pustulate, opaque above, densely to abundantly stellate beneath (sometimes the blades nearly glabrous in *S. oreophila*).
- c. Inflorescence 35- to 200-flowered; leaves normally wider than 8 cm; sepals submarginally pubescent within; stamens 25-52. Eastern and southern Mexico to Honduras9. *S. scabrida*
- cc. Inflorescence usually less than 35-flowered, the leaves usually narrower than 8 cm; sepals glabrous within.
- d. Sepals usually shorter and narrower than 3 mm, sparingly stellate or tufted and scattered-strigillose, the stellate trichomes more conspicuous; stamens 22-27, the anthers about 1 mm long. Mexico: Michoacan, Guerrero and Oaxaca10. *S. pringlei*

- dd. Sepals frequently longer and wider than 3 mm, abundantly strigose or shaggy-strigillose and less conspicuously appressed-stellate; stamens 21-24, the anthers 2-2.5 mm long. Mexico: Chiapas; Guatemala11. *S. oreophila*
- bb. Leaves glabrous or abundantly to sparingly sericeous above, frequently glossy above, villous or cottony in the axils of the secondary veins beneath, otherwise glabrous or abundantly to sparingly hirsute beneath; sepals glabrous within; stamens 30-35, the anthers ca 2 mm long. Mexico: Chiapas; Guatemala12. *S. zahlbruckneri*
- aa. Leaves homotrichous beneath with only multicellular unbranched trichomes except in the sometimes villous-barbate axils of the secondary veins (*S. selerorum* sometimes also stellate).
- e. Leaves densely to abundantly pubescent above (*S. konzattii* sometimes glabrescent).
- f. Leaves densely to abundantly setose-setulose above or villous-barbate in the axils of the secondary veins beneath; branch tips never paleaceous; inflorescence 30- to 175-flowered.
- g. Sepals, petioles and peduncles abundantly to densely pubescent with trichomes usually shorter than 2 mm; flowers 11-14 mm broad, the inner and imbricate sepals subapically pubescent within13. *S. aspera*
- gg. Sepals, petioles and peduncles densely to abundantly pubescent with trichomes frequently longer than 2 mm; flowers 14-22 mm broad, the sepals glabrous within14. *S. selerorum*
- ff. Leaves abundantly sericeous, hirsute or glabrescent above, not barbate in the axils of the secondary veins beneath; branch tips sometimes paleaceous; inflorescence 6- to 67-flowered; sepals, petioles and peduncles densely to abundantly paleaceous or hirsute, the trichomes frequently longer than 2 mm; sepals glabrous within15. *S. konzattii*
- ee. Leaves scattered-pubescent above (*S. serrata* rarely abundantly minutely sericeous).
- h. Sepals hoary-pubescent with minute branched trichomes, the outer and imbricate sepals subapically pubescent within; leaves villous-barbate in the axils of the secondary veins beneath; inflorescence 18- to 78-flowered. Mexico: Vera Cruz and Oaxaca16. *S. pendunculata*
- hh. Sepals scattered to abundantly strigillose, rarely densely hirsute to sericeous, not hoary-pubescent, the inner and imbricate sepals rarely subapically pubescent.
- i. Leaves about 2.5 times longer than broad, frequently villous-barbate in the axils of the secondary veins beneath; inflorescence 12- to 56-flowered. Mexico: Sinaloa to Oaxaca17. *S. serrata*
- ii. Leaves about 3 times longer than broad, not barbate in the axils of the secondary veins beneath; inflorescence 4- to 20-flowered. Mexico: Chiapas; Guatemala18. *S. angustifolia*

9. SAURAUIA SCABRIDA Hemsl., Diagn. Pl. Nov. 3, 1878. (Type: *Bourgeau 1747*)

S. nelsoni Rose, Contr. U. S. Nat. Herb. **8**: 52, 1903. (Type: *Nelson 800*)

S. selerorum Busc., var. *pseudonelsoni* Busc., Malpighia **26**: 107, 1913. (Type: *Galeotti s.n.*)

S. villosa DC. var. *macrantha* Busc., loc. cit. 310. (Type: *Nelson 464*)

S. villosa var. *tuberculata* Busc., loc. cit. 312 (Type: *Heyde & Lux 6077*)

S. villosa var. *scabrida* Busc., loc. cit. 390, 1914. (Type: *Hahn s.n.*)

S. scabrida var. *hemsleyana* Busc., loc. cit. 409. (Type: *Bourgeau 3041*)

Shrubs and trees to 13 m; copiously pubescent. *Leaf* blades elliptic to obovate, acute to acuminate, the base acute to obtuse, frequently oblique, the margins setaceo-serrulate, 10-40 cm long, 5-19 cm wide, chartaceous to subcoriaceous, the

secondary veins 17-27 pairs, the tertiary veins elevated, more prominent than the lesser reticulation, abundantly setulose (trichomes frequently reduced to mere warts at the northern extension of this species) between the veins above, densely to abundantly stellate or dendroid between the veins beneath; petioles 1-5 cm long, 2-6 mm in diam, terete to somewhat canaliculate above near the blade. *Inflorescences* 35- to 200-flowered, 9-28 cm long, 3-13 cm wide, the primary peduncles 7-17 cm long, the bracts linear-triangular to triangular, 1-8 mm long. *Flowers* 12-15 mm broad, buds to 4-6 mm in diam, the pedicels to 3-15 mm long; sepals 5, 4 mm long, 3-4 mm wide, the inner 2 medially densely heterotrichous, submarginally glabrous, ciliate, the imbricate sepal densely heterotrichous on the exterior half, submarginally glabrous, ciliate on the interior half, the outer 2 densely heterotrichous, all submarginally radiate-pubescent within; petals 5, white to pinkish, oblong to obovate, 6-9 mm long, 3-5 mm wide, obtuse to incised at the apex; stamens 25-52, the anther 2 mm long, the filament 2 mm long, ovary 4- to 5-locular, globose, 4- to 5-sulcate, glabrous, the styles 4-5, obsolete to 4 mm long, the stigmas simple to subcapitate. *Berries* 5-6 mm in diam, globose, 4- to 5-sulcate, glabrous.

Pine woods, near river, second growth thicket, wet thicket, damp pine forest, slopes, barranca, open sun, red sandy soil, sandy hillsides, ravine, edge of mesophytic forest, liquidambar forest, along road; 500-2100 m; flowering throughout the year.

Vernacular names: *Nistamalillo* (San Luis Potosí—Edwards), *Cerbatana* (Guatemala—Steyermark), *Moco* (Guatemala—Standley).

MEXICO: CHIAPAS: Mt Ovando, *Matuda S-172* (MICH, MO); betw Teneapa & Yajalon, *Nelson 3249* (GH, US). HIDALGO: Chapulhuacán, *Kenoyer 982* (F); *Lundell & Lundell 7164* (MICH, NY); S of Chapulhuacán, *Clark 7402* (MO); nr Chapulhuacán, *Hunter 33* (MO); Cuesta grande de Chiconquiaco, *Schiede & Deppe 329* (HAL); on hwy betw Santa Ana & Chapulhuacán, *Moore 3394* (GH, US); Jacala, *Hitchcock & Stanford 6976* (GH, US). OAXACA: Hacienda de Caciques, *Smith 614* (GH); Totontepec, *Nelson 800* (US). SAN LUIS POTOSÍ: Tamazunchale, *Edwards 650* (F, MO); *Chute M-24* (MICH); nr Xilitla, *Hunter 125* (MO). VERA CRUZ: Valle de Cordova, *Bourgeau 1747* (F, P); V. Tuxtla, *Nelson 464* (US); Misantla, *Hahn s.n.* (F); Orizaba, *Botteri 210* (F). WITHOUT PRECISE LOCALITY: Huatemalco, *Liebmann 361* (US); S. Martín, *Galeotti s.n.* (BR); Tlapacoyo, *Liebmann 362* (F); Yalala, *Liebmann 372* (F).

GUATEMALA: ALTA VERAPAZ: betw Chirriacté & Semococh, *Steyermark 46325* (F); Cobán, *Standley 69085* (F), *69329* (F), *69420* (F); *Türckheim 30* (GH, NY, US), *II778* (F, GH, MO); 2 mi E of Cobán, *King 3316* (MICH, US); Saquijá, 43 km NE of Cobán, *Standley 70136* (F); ca 2 mi W of Santa Cruz, *King 3335* (MICH, US); Senahú, *Hatch & Wilson 151* (F). GUATEMALA: Chinautla, *Smith 2518* (GH, US); *Hayes s.n.* (F, MO, US); Guatemala City, *Lewis 842* (F); barranca N of Guatemala City, *Popenoe 721* (A, US); "La Aurora," *Aguilar 472* (F); Las Vacas barranca, *Hayes s.n.* (F, GH). HUEHUETENANGO: pine woods of Cerro Jolomtac, Sierra de los Cuchumatanes, *Steyermark 49501* (F); Jacaltenango, *Seler & Seler 3100* (GH); Soloma, *Skutch 1061* (A). QUICHÉ: *Aguilar 1141* (F); Nebaj, *Skutch 1718* (A, F, US). SANTA ROSA: Río de los Esclavos, *Heyde & Lux 6077* (F, GH, US). ZACAPA: along Rillito del V. Monos, *Steyermark 42368* (A, F).

EL SALVADOR: CHALATENANAGO: betw San Ignacio & Citala, *Allen 7104* (F, US).

HONDURAS: COMAYAGUA: nr El Achote, *Yuncker et al. 5889* (F, GH, MO, US); 10 mi NW of Siguatepéque, *Williams & Molina 11461* (F, GH).

10. SAURAUIA PRINGLEI Rose, *Contr. U. S. Nat. Herb.* **7**: 52, 1903. (Type: *Pringle 4668*)

S. pringlei var. *micrantha* Busc., *Malpighia* **26**: 137, 1913. (Type: *Galeotti 3113*)

S. wildemanii Busc., loc. cit. 143. (Type: *Galeotti 3088*)

S. buscalioniana Blake, *Contr. Gray Herb.* **52**: 74, 1917. (Type: *Langlassé 1004*)

Shrubs and trees to 9 m; copiously to sparingly pubescent. *Leaf* blades narrowly elliptic to obovate, acute to acuminate, the base acute to obtuse, sometimes oblique, the margins serrate to serrulate, 9-26 cm long, 2-9 cm wide, chartaceous, the secondary veins 9-18 pairs, the tertiary veins elevated, more prominent than the lesser reticulation, abundantly setulose to sparingly tuberculate between the veins above, densely dendroid to sparingly stellate between the veins beneath, villous-barbate in the axils of the secondary veins beneath; petioles 1-3 cm long, 2-3 mm in diam. *Inflorescences* 10- to 37-flowered, 7-12 cm long, 3-7 cm wide, the primary peduncle 3-8 cm long, the bracts linear to triangular, 1-3 mm long. *Flowers* 11-14 mm broad, buds to 3-5 mm in diam, the pedicels 1-7 mm long at anthesis; sepals usually 5, 1-3 mm long, 1-3 mm wide, the inner 2 medially sparingly strigillose under more conspicuous stellate pubescence, laterally glabrous, ciliate, the imbricate sepal sparingly strigillose under more conspicuous stellate pubescence on the exterior half, glabrous, ciliate on the interior half, the outer 2 sparingly strigillose under more conspicuous stellate pubescence, all glabrous within; petals usually 5, white, usually obovate, 4-6 mm long, 2-4 mm wide, obtuse to incised at the apex; stamens 22-27, the anther 1.0-1.5 mm long, the filament 1.5-2.0 mm long; ovary 5-locular, globose, 5-sulcate, glabrous, the styles 5, obsolete to 1.5 mm long, the stigmas simple to subcapitate. *Fruit* not seen.

Barranca, by streamlet, sunny, wet canyon, western slopes; 1800-2800 m; flowering from March through July.

MEXICO: GUERRERO: Toro Muerto Mina, *Hinton 14212* (MICH, NY, US); Yesceros, Mina, *Hinton 14404* (MICH, NY, US); Omiltemé, *Nelson 7051* (GH, US); second ridge W of Petlacala, *Mexia 9051* (F, GH, MO, NY, US). OAXACA: *Galeotti 3113* (BR), *s.n.* (F); *Liebmann 375B* (F); Juquila, *Galeotti 3088* (BR); Lactopa [Lacova?] *Liebmann 369* (F, US); Sierra de San Felipe, *Pringle 4668* (A, F, GH, NY, US); Mt Zempoaltepec, *Nelson 606* (US). WITHOUT PRECISE LOCALITY: Michoacan & Guerrero, *Langlassé 1004* (F, GH, US).

Galeotti used the number 3088 for two different collections, one from Juquila in Oaxaca and the other from Jalapa in Vera Cruz. Buscalioni based his *Saurauia wildemanii* on the former. He also annotated a specimen of this collection as *S. willdenowii*. Hooker based his *S. barbiger*, a synonym of *S. leucocarpa*, on the latter collection.

Blake differed with Buscalioni on his determination of *Langlassé 1004*. The plant is more robust, the leaves, flowers and trichomes somewhat larger than for the population as a whole; however, the collection falls within the geographical range of *S. pringlei* and except for larger dimensions agrees morphologically with the other collections.

11. SAURAUIA OREOPHILA Hemsl., *Diag. Pl. Nov.* 3, 1878. (Type: *Salvin s.n.*)

S. latipetala Hemsl., loc. cit. 4. (Type: *Ghiesbreght 646*)

S. pauciflora Rose, *Contr. U.S. Nat. Herb.* 8: 52, 1903. (Type: *Nelson 3206*)

S. subalpina Donn. Sm., *Bot. Gaz.* 42: 292, 1906. (Type: *Donn. Sm. Pl. Guat. 2171*)

S. oreophila f. *genuina* Busc., *Malpighia* 26: 142, 1913, nom. nud.

S. oreophila f. *rubra* Busc., loc. cit., nom. subnud. (Type: *Salvin s.n.*)

S. pauciflora var. *ghiesbreghtii* Busc., loc. cit. 291, 1913. (ex char.; Type: *Ghiesbreght 606*, not seen)

S. parviflora var. *ghiesbreghtii* Busc., loc. cit. 27: 302, 1916, nom. nud.

Shrubs and trees to 8 m; copiously to sparingly pubescent. *Leaf* blades narrowly elliptic to obovate, acuminate to acute, the base acute to obtuse, frequently oblique, the margins serrulate, 7-21 cm long, 2-6 cm wide, chartaceous, the secondary veins 9-23 pairs, the tertiary veins elevated, more prominent than the lesser reticulation, the epidermis frequently pustulate, abundantly to sparingly strigose to setulose between the veins above, abundantly stellate and minutely sericeous to nearly glabrous between the veins beneath, frequently villous-barbate in the axils of the secondary veins beneath; petioles 1-4 cm long, 1-2 mm in diam, terete to canaliculate above. *Inflorescences* 1- to 20-, rarely 30-flowered, 2-11 cm long, 1-5 cm wide, the primary peduncle 2-6 cm long, the bracts linear to triangular, 2-8 mm long, rarely foliaceous, 30 mm long. *Flowers* 15-22 mm broad, buds to 4-6 mm in diam, the pedicels to 4-17 mm long; densely to abundantly shaggy-hirtellous and stellate; sepals 5, rarely 6, 3-6 mm long, 2-6 mm wide, the inner 2 medially abundantly strigose or shaggy-strigillose and appressed-stellate, laterally glabrous, ciliate, the imbricate sepal abundantly strigose or shaggy-strigillose and appressed-stellate on the exterior half, glabrous, ciliate on the interior half, the outer 2 abundantly strigose or shaggy-strigillose and appressed-stellate, all glabrous within; petals 5, white, rarely pink, oblong to obovate, 7-9 mm long, 4-6 mm wide, obtuse to incised at the apex; stamens 21-24, the anther 2.0-2.5 mm long, the filament 2.0-2.5 mm long; ovary 5-locular, globose, 5-sulcate, glabrous, the styles 5, obsolete to 5 mm long, the stigmas simple to capitate. *Berries* 5-12 mm in diam, globose to ellipsoid, 5-sulcate, glabrous.

Cloud forest, wet forest, slopes, bushy hillside, bushy thicket; 2100-3300 m; flowering throughout the year.

Vernacular name: *Moco* (Guatemala—Standley)

MEXICO: CHIAPAS: *Ghiesbreght* 646 (GH, MO, NY); nr San Cristóbal, *Nelson* 3206 (GH, US).

GUATEMALA: CHIMALTENANGO: Chichavac, *Skutch* 653 (A, F, US); "Santa Elena," *Skutch* 153 (A, US); Las Calderas, *Standley* 57805 (A, F). QUICHÉ: Nebaj, *Skutch* 1741 (A, F, NY, US), 1745 (A, F); San Miguel Uspantán, *Heyde & Lux* 2946 (GH, NY, US). SACATEPÉQUEZ: V. Agua, *Smith* 2171 (GH); San Rafael, *Smith* 1326 (GH, NY, US); above Santa María de Jesús, *Standley* 65057 (F), 65088 (F), 65279 (F). SOLOLÁ: San Lucas, *Kellerman* s.n. (US); Inter Godinez et S. Lucas, *Bernoulli & Cario* 3294 (K). WITHOUT PRECISE LOCALITY: V. Fuego, *Salvin* s.n. (K); San Martín, *Johnston* 1306 (F).

12. SAURAUIA ZAHLBRUCKNERI Busc., *Malpighia* **29**: 433, 1923. (Type: *Türckheim III286*)

Shrubs and trees to 13 m; copiously to sparingly pubescent. *Leaf* blades narrowly elliptic to obovate, acuminate to acute, the base acute to obtuse, the margins minutely serrulate, 7-27 cm long, 2-11 cm wide, chartaceous to subcoriaceous, the secondary veins 10-23 pairs, the tertiary veins elevated, more prominent than the lesser reticulation, glabrous to abundantly sericeous between the veins above, glabrous or abundantly to sparingly hirsute between the veins beneath except the villous-barbate or cottony axils of the secondary veins; petioles 1-5 cm long, 1-3 mm in diam, flattened to canaliculate above. *Inflorescences* 10- to 50-flowered, 5-21 cm long, 2-10 cm wide, the primary peduncle 3-11 cm long, the bracts linear to triangu-

lar, 3-10 mm long. *Flowers* 12-19 mm broad, buds to 4-8 mm in diam, the pedicels to 3-10 mm long; sepals 5, 4-5 mm long, 4-5 mm wide, the inner 2 medially abundantly strigillose or hirsute-hirtellous and sometimes also filiform, laterally glabrous, ciliate, the imbricate sepal abundantly strigillose or hirsute-hirtellous and sometimes also filiform on the exterior half, glabrous, ciliate on the interior half, the outer 2 abundantly strigillose or hirsute-hirtellous and sometimes also filiform, all glabrous, rarely subapically pubescent within; petals 5, white, oblong, obovate or nearly circular, 5-10 mm long, 4-7 mm wide, obtuse to incised; stamens 30-35, the anther 2.0-2.5 mm long, the filament 2.5 mm long; ovary 5-locular, globose, 5-sulcate, glabrous, the styles 5, obsolete to 5 mm long, the stigmas simple to subcapitate. *Fruit* not seen.

Along road, barranca, wet thicket, forested slopes bordering streams, second growth, rich dense forest, wet forest, cloud forest, damp limestone thickets; 200-2500 m; flowering throughout the year.

MEXICO: CHIAPAS: Cerro del Boquerón, *Purpus* 7014 (US); Mt Ovando, *Matuda* 0441 (MICH, US); Mt Pasitar, *Matuda* 1010 (A, MICH, MO); Siltepec, *Matuda* 4089 (A, F, MICH, NY); Saxchanal, *Matuda* 17809 (F).

GUATEMALA: ALTA VERAPAZ: Chamá to Cobán, *Johnson* 565 (US); region of Chelac, NE of San Pedro, Carchá, *Standley* 70394 (F); vic of Cobán, *Standley* 89930 (F); Cobán, *Türkheim* 2467 (US), *III*286 (F, GH, NY, US); nr Cobán, *Standley* 71596 (F); Saquijá, 43 km NE of Cobán, *Standley* 70145 (F); nr Senahú, *Cook & Doyle* 37 (US); ca 8 km below Tactic, *Standley* 90544 (F). HUEHUETENANGO: betw Ixcán & Finca San Rafael, *Steyermark* 49421 (A, F); vic of Nucapoxlac, *Steyermark* 48953 (F).

The Mexican collections, with petioles, peduncles and leaves generally more pubescent, differ markedly from the Guatemalan. The cottony border of the midrib of mature leaves, so conspicuous in Guatemalan specimens, is lacking in the Mexican; however, in the latter, the axils of the secondary veins on the underside of the leaves are villous-barbate. Although there is a tendency to shed the juvenile foliar pubescence in the latter, the tendency is less pronounced than in the Guatemalan plants. The deep wine-red color of the petioles, peduncles and major veins of dried specimens is a helpful characteristic for purposes of identification.

13. SAURAUIA ASPERA Turcz., Bull. Soc. Nat. Moscou **31**: Partie 1: 242, 1858, (Type: *Galeotti* 7325)

S. aspera f. *delessertiana* Busc., *Malpighia* **27**: 303, 1916. (Type: *Galeotti* 7325)

S. englesingii Standl., *Field Mus. Publ. Bot.* **4**: 233, 1929. (Type: *Englesing* 281)

S. perseifolia Standl. & Steyer., loc. cit. **23**: 216, 1947. (Type: *Steyermark* 41784)

Trees to 15 m; copiously pubescent with trichomes usually shorter than 2 mm. *Leaf* blades obovate to elliptic, acute to acuminate, the base obtuse, frequently oblique, the margins setaceo-serrulate, 9-34 cm long, 4-14 cm wide, chartaceous, the secondary veins 19-25 pairs, the tertiary veins elevated, more prominent than the lesser reticulation, abundantly setulose, strigillose, hirsute or hirtellous between the veins above, abundantly hirsute to hirtellous between the veins beneath, villous-barbate in the axils of the secondary veins beneath; petioles 1-3 cm long, 1-4 mm in diam, terete to somewhat canaliculate above. *Inflorescences* 35- to 100-flowered, 6-24 cm long, 6-11 cm wide, the primary peduncle 1-14 cm long, the bracts linear

to triangular, 1-5 mm long. *Flowers* 11-14 mm broad, buds to 3-5 mm in diam, the pedicels 1-10 mm long; sepals 5, 3-5 mm long, 3-4 mm wide, the inner 2 medially densely shaggy-strigillose or hirtellous mixed with smaller trichomes, laterally appressed-pubescent, submarginally glabrous, ciliate, the imbricate sepal densely shaggy-strigillose or hirtellous mixed with smaller trichomes on the exterior half, appressed-pubescent, submarginally glabrous, ciliate on the interior half, the outer 2 densely shaggy-strigillose or hirtellous mixed with smaller trichomes, all glabrous within except the subapically pubescent outer and imbricate sepals; petals 5, white to pink, oblong to obovate, 5-7 mm long, 3-5 mm wide, obtuse to incised at the apex; stamens 33-41, the anther 2.0-2.5 mm long, the filament 2.0-3.0 mm long; ovary 5-locular, globose, 5-sulcate, glabrous, the styles 5, obsolete to 3 mm, the stigmas simple to subcapitate. *Berries* 6-8 mm in diam, globose, 5-sulcate, glabrous.

Dense forest, along river, wet thicket and bushland; 20-2000 m; flowering from December to August.

MEXICO: CHIAPAS: Escuintla, *Matuda* 16809 (F, NY); Mt Ovando, *Matuda* 0642 (A, F, MICH, MO, NY). OAXACA: *Galeotti* 7235 (US). VERA CRUZ: Minatitlan, *Andrieux* 199 (K).

GUATEMALA: IZABAL: Cerro San Gil, along Río Tameja, *Steyermark* 41784 (F, US). WITHOUT PRECISE LOCALITY: in Finca Santa Inés, *Record & Kuylen* G79 (GH, US).

HONDURAS: ATLÁNTIDA: vic of La Ceiba, *Yuncker et al.* 8689 (F, GH, MO, NY, US); nr Tela, *Standley* 53521 (A, F, US). WITHOUT PRECISE LOCALITY: *Bangham* 322 (A, F); mts back of Puerto Sierra, *Wilson* 171 (NY, US); San Pedro Sula, *Salvoza* 831 (A).

NICARAGUA: WITHOUT PRECISE LOCALITY: Braggman's Bluff, *Englesing* 281 (A, F, GH, NY); 200 mi up Wanks River, *Schramm s.n.* (F).

In spite of its broad distribution, *S. aspera* is rather poorly represented in herbaria. It is distinguished from *S. scabrida*, which it resembles, by a lack of stellate pubescence on the lower surface of its leaves which are villous-barbate in the axils of the secondary veins beneath.

The Mociño, Sessé & Moldonado collection, 4802, a photo of which I have seen, is also representative of this population.

The Gray Herbarium card index lists *S. parviflora* var. *ghiesbrechti* f. *delessertiana* Busc. (*Malpighia* **27**: 303, 1916). This is an incorrect notation of *S. aspera* f. *delessertiana* Busc. (loc. cit.).

14. SAURAUIA SELERORUM Busc., *Malpighia* **26**: 100, 1913. (Type: *Seler* 2819)

Shrubs and trees to 13 m; copiously pubescent with trichomes frequently longer than 2 mm, but never paleaceous. *Leaf* blades narrowly to broadly elliptic to obovate, rarely broadly subobtrullate, acute to acuminate, rarely obtuse, the base acute to obtuse, sometimes oblique, the margins setaceo-serrulate, 12-48 cm long, 4-18 cm wide, chartaceous to subcoriaceous, the secondary veins 15-30 pairs, the tertiary veins elevated, more prominent than the lesser reticulation, the pubescence densely to abundantly setose-setulose between the veins above, densely to abundantly loriform, hirsute or hirtellous and sometimes also stellate between the veins beneath; petioles 1-9 cm long, 2-5 mm in diam, flattened to canaliculate above. *Inflorescences* 30- to 175-flowered, 6-35 cm long, 2-11 cm wide, the primary peduncle 3-23 cm long, the bracts linear to triangular, 2-10 mm long, rarely foliaceous,

to 25 mm long. *Flowers* 14-22 mm broad, buds to 4-7 mm in diam, the pedicels 2-25 mm long; sepals 5, sometimes 6, 3-5 mm long, 3-5 mm wide, the inner 2 medially densely to abundantly hirsute to hirtellous and sometimes also stellate, laterally glabrous, ciliate, the imbricate sepal densely to abundantly hirsute to hirtellous and sometimes also stellate on the exterior half, glabrous, ciliate, on the interior half, densely to abundantly hirsute to hirtellous and sometimes also stellate, all glabrous within; petals 5, sometimes 6, white to pinkish, 7-10 mm long, 4-8 mm wide, obtuse to incised at the apex; stamens 23-35, the anther 2.0-2.5 mm long, the filament 2.0-2.5 mm long; ovary 5- sometimes 4-locular, globose, 4- to 5-sulcate, glabrous, the styles 4-5, obsolete to ca 4 mm long, the stigmas simple to capitate. *Berries* 7-10 mm in diam, globose, 4- to 5-sulcate, glabrous.

Densely mixed forest on white sand slopes, densely wooded damp barranca, wet slopes of forested ravine along stream, moist oak-forest, cutover land, cloud forest, upper rocky slopes, near waterfall, deep woods; 600-4038 m; flowering throughout the year.

Vernacular names: *Moco*, *Moquillo* (Guatemala—Standley); *Zapote de Montaña* (El Salvador—Carlson); *Mocoso* (Honduras—Standley), *Pacón* (Honduras—Edwards).

MEXICO: CHIAPAS: Cerro del Boquerón, *Purpus* 7013 (A, F, GH, MO, NY, US); Los Lagos, 34 mi SE of Comitán, *Carlson* 2299 (F); Motozintla, *Matuda* 15515 (F); Mt Pasitar, *Matuda* 1003 (A, F, MICH, MO), 1694 (A, F, K, NY, MICH, MO); Mt Tacaná, *Matuda* 2301 (A, F, MICH, NY), 2947 (F, MICH).

GUATEMALA: CHIMALTENANGO: Chichavac, *Skutch* 405 (A, F, US), 410 (A, F, US). CHIQUIMULA: nr Amatillo, *Steyermark* 30532 (F). GUATEMALA: Finca La Aurora, *Aguilar* 484 (F). HUEHUETENANGO: San Juan Ixcay, *Steyermark* 50014 (F); San Martín, *Seler & Seler* 2819 (GH, US). JUTIAPA: V. Suchitán, NW of Asunción Mita, *Steyermark* 31911 (F). QUEZALTENANGO: V. Zunil, at & above Aguas Amargas, *Standley* 65358 (A, F); above Mujuliá, betw San Martín Chile Verde & Colomba, *Standley* 85542 (F); region of Las Nubes, *Standley* 83602 (F); El Pocito, S of San Martín Chile Verde, on road to Colomba, *Standley* 84897 (F); W slope of V. Zunil, *Standley* 67375 (F); V. Zunil, *Steyermark* 34780 (F). SAN MARCOS: San Marcos, *Standley* 66197 (F); above San Rafael Pié de la Cuesta, *Standley* 68645 (F); betw Sibinal & Canjula, V. Tacaná, *Steyermark* 36037 (F, NY). SUCHITEPÉQUEZ: Santa Clara, *Steyermark* 46657 (F, NY). ZACAPA: vic of Finca Alejandria, Sierra de las Minas, *Steyermark* 29881 (F); Río Lima, Sierra de las Minas, *Steyermark* 30036 (F); Sierra de las Minas, along Río Repollal, *Steyermark* 42548 (F).

EL SALVADOR: SANTA ANA: nr Metapan, *Carlson* 755 (F); Montecristo, *Allen & Severen* 7120 (F).

HONDURAS: INTIBUCÁ: vic of La Esperanza & Intibucá, *Standley* 25225 (F). MORAZAN: Las Flores, *Standley* 13246 (F); Mt San Juancito, *Glassman* 1987 (F, NY); above San Juancito, *Hawkes et al.* 2046 (F); SW of San Juancito, *Williams & Molina* 12799 (F); Mt Uyuca, *Allen* 4009 (MO); *Glassman* 2035 (F, NY); *Pfeifer* 1419 (MO), 1452 (MO); *Standley & Williams* 672 (F); *Valerio* 738 (F); *Williams & Molina* 10276 (A, F, MO); *Carlson* 2467 (F). STA. BARBARA: upper rocky slopes & summit of Cerro de Sta. Barbara, *Allen et al.* 6076 (F, US). TEGUCIGALPA: Rosario, *Edwards* 52 (A).

Saurauia scabrida, sympatric with *S. selerorum* throughout the range of the latter, has long been identified with it under the name *S. villosa*. Standley & Steyermark (1949) were correct in treating the two populations as distinct. For the former, they used the name *S. villosa*; they called the latter *S. subalpina*, an obscure synonym of *S. oreophila*, which had not been used since its publication.

Over most of its range, *S. selerorum* is distinguished from *S. scabrida* by longer

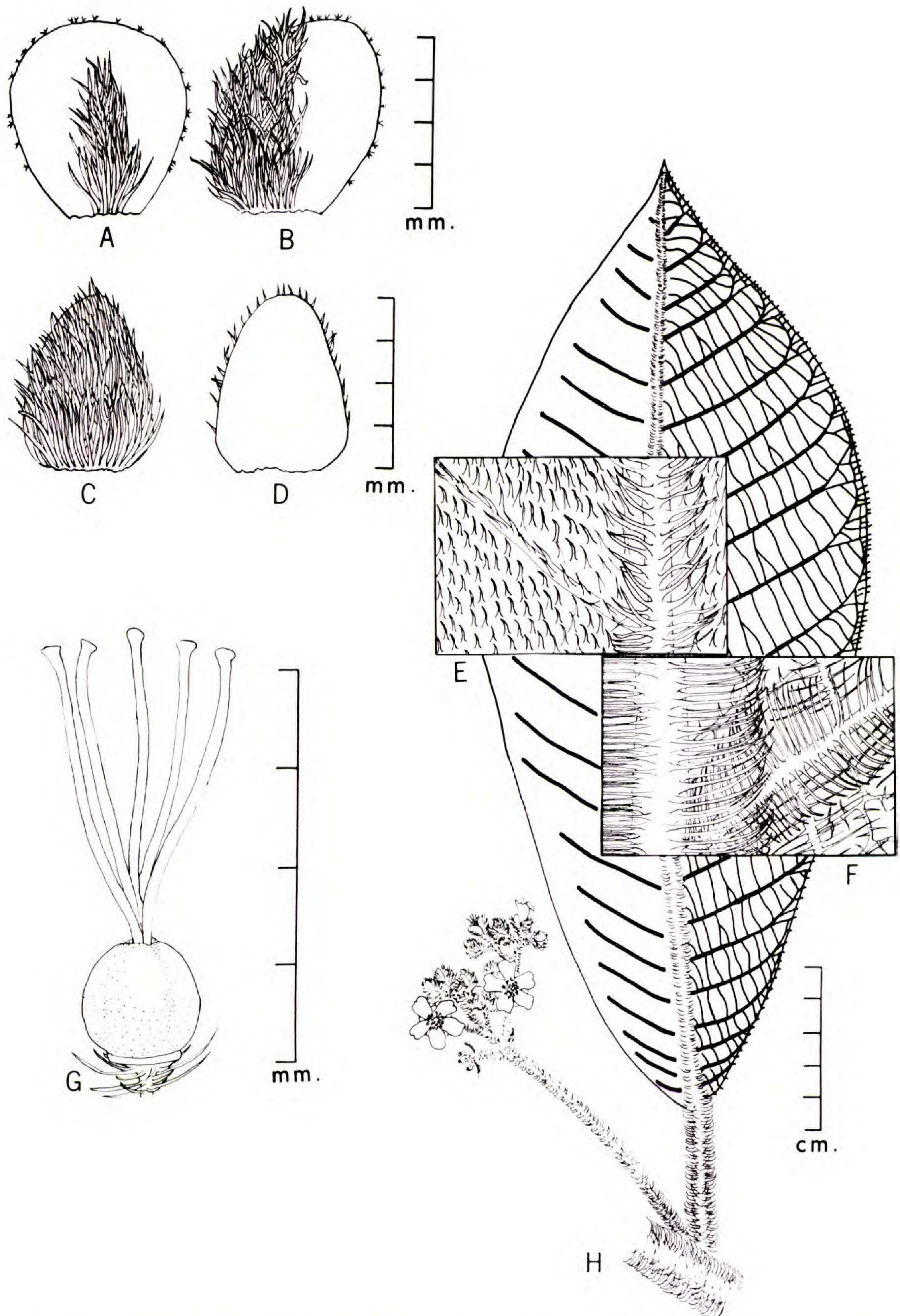


Fig. 4. *S. selerorum*. A. Inner sepal, outer surface; B. Imbricate sepal, outer surface; C. Outer sepal, outer surface; D. Outer sepal, inner surface; E. Upper leaf surface; F. Lower leaf surface; G. Ovary; H. Leaf and inflorescence.

multicellular unbranched hairs and a lack of stellate pubescence on the lower leaf surface. In Mexico and western Guatemala, however, the leaves may be quite stellate beneath and the sepals, which are not usually pubescent within, are sometimes submarginally pubescent.

15. SAURAUIA CONZATTII Busc., *Malpighia* **25**: 403, 1913. (Type: *Conzatti & Cancino* 2433)

S. matudai Lundell, *Contr. Univ. Mich. Herb.* **7**: 27, 1942. (Type: *Matuda* 4339)

S. cuchumatanensis Standl. & Steyerl., *Field Mus. Publ. Bot.* **23**: 215, 1947. (Type: *Steyermark* 49810)

Shrubs and trees to 7 m; copiously pubescent, sometimes paleaceous. *Leaf* blades elliptic to obovate, acuminate, the base acute to obtuse, sometimes oblique, the margins serrulate to setaceo-serrulate, 11-27 cm long, 5-10 cm wide, membranaceous to subcoriaceous, the secondary veins 11-24 pairs, the tertiary veins elevated, more prominent than the lesser reticulation, abundantly hirsute to sericeous or glabrescent between the veins above, abundantly hirsute to sericeous or glabrous between the veins beneath, not barbate in the axils of the secondary veins beneath; petioles 1-4 cm long, 1-3 mm in diam, flattened to canaliculate above. *Inflorescences* 6- to 67-flowered, 7-21 cm long, 2-11 cm wide, the primary peduncle 5-13 cm long, the bracts linear, 2-17 mm long. *Flowers* 15-25 mm broad, buds to 5-7 mm in diam, the pedicels 5-13 mm long; sepals 5, 3-5 mm long, 2-5 mm wide, the inner 2 medially abundantly hirsute, laterally glabrous, ciliate, the imbricate sepal abundantly hirsute on the exterior half, glabrous, ciliate on the interior half, the outer 2 abundantly hirsute, all glabrous within; petals 5, white, oblong to obovate, 6-9 mm long, 3-7 mm wide, obtuse to incised at the apex; stamens 13-29, the anther 1.5-2.5 cm long, the filament 2.0-2.5 cm long; ovary 5-, rarely 4-locular, globose, 5-, rarely 4-sulcate, glabrous, the styles 5, rarely 4, obsolete to 3 mm long, the stigmas simple to capitate. *Berries* 6 mm in diam, globose, 5- rarely 4-sulcate, glabrous.

Advanced forest, dark rain forest, limestone area; 1500-3000 m; flowering in January and June to August.

Vernacular names: *Ma-gwa-ni*, *Mameyito* (Oaxaca—Schultes).

MEXICO: CHIAPAS: Letrero, nr Siltepec, *Matuda* 4339 (A, MO, NY); Laguna Ocotál Grande, 45 km E of Ocosingo, *Dressler* 1464 (GH, NY, US). OAXACA: Cuyamecalco, Cuicatlán, *Conzatti* 2337 (F), *Conzatti & Cancino* 2433 (US); betw San Pedro Yolox & Tepetotutla, *Schultes* 695 (GH, US); Zantla, *Conzatti & Gonzales* 773 (GH). WITHOUT PRECISE LOCALITY: *Liebmann* 364 (F); Totulipa, *Liebmann* 366 (F).

GUATEMALA: ALTA VERAPAZ: Chicoyou, Cobán, *Hatch & Wilson* 229 (F). HUEHUETENANGO: Cerro Huitz, betw Mimanhuitz & Yulhuitz, Sierra de los Cuchumatanes, *Steyermark* 48560 (F, GH); Cruz de Limon, betw San Mateo Ixtatan & Nuca, *Steyermark* 49810 (F), 49865 (A, F, NY).

Some plants of *S. conzattii* bear the most robust of all the trichomes found on specimens of North American species of *Saurauia*. Although they are frequently shed on the upper leaf surface, the paleaceous or hirsute trichomes remain conspicuous on the petioles, peduncles and young branch tips. *Steyermark* 49865 differs from the other collections in having smaller leaves and flowers, as well as scattered-hirtellous sepals.

16. SAURAUIA PEDUNCULATA Hook., Ic. Pl. **4**: t. 341-342, 1841. (ex icon.)

S. pedunculata f. *veranii* Busc., Malpighia **28**: 236, 1917. (Type: *Pringle* 8105)

S. pedunculata var. *leucocarpa* Busc., loc. cit. 237. (ex char.; Type: *Satorius* 5409, not seen)

S. pedunculata var. *leucocarpa* f. *veranii* Busc., loc. cit. 315, 1918. (Type: *Bourgeau* 2060)

Trees to 6 m, sparingly pubescent. Leaf blades elliptic to obovate, acute to acuminate, the base acute to obtuse, the margins serrulate, 10-24 cm long, 3-11 cm wide, chartaceous, the secondary veins 17-22 pairs, the tertiary veins elevated, more prominent than the lesser reticulation, scattered-strigillose between the veins above, glabrous between the veins beneath, villous-barbate in the axils of the secondary veins; petioles 1-5 cm long, 1-3 mm in diam, flattened to canaliculate above. Inflorescences 18- to 78-flowered, 10-24 cm long, 3-9 cm wide, the primary peduncle 6-12 cm long, the bracts foliaceous or linear to triangular, 1-25 mm long. Flowers 12-15 mm broad, buds to 4-7 mm in diam, the pedicels to 3-11 mm long; sepals 5, 4-5 mm long, 3-5 mm wide, the inner 2 medially densely hoary-pubescent with minute branched trichomes, sub-marginally glabrous, ciliate, the imbricate sepal densely hoary-pubescent with minute branched trichomes on the exterior half, submarginally glabrous, ciliate, the imbricate sepal densely hoary-pubescent with minute branched trichomes on the exterior half, submarginally glabrous, ciliate on the interior half, the outer 2 densely hoary-pubescent with minute branched trichomes, all glabrous within except the subapically pubescent outer and imbricate sepals; petals 5, white, oblong to obovate, 7-8 mm long, 4-6 mm wide, obtuse to incised at the apex; stamens 28-42, the anther 2.0-2.5 mm long, the filament 2.0-3.0 mm long; ovary 5-locular, globose, 5-sulcate, glabrous, the styles 5, obsolete to 4 mm long, the stigmas simple to capitate. Berries 8 mm in diam, globose, glabrous.

Along streams, moist rocky localities, rocky banks, forest; 900-1500 m; flowering throughout the year.

MEXICO: OAXACA: *Ghiesbreght* 75 (F). VERA CRUZ: Acultzinco, *Matuda* 1150 (A, F, MICH, MO, NY); Valle de Cordova, *Bourgeau* s.n. (F), 2060 (P), 2241 (GH); Jalapa, *MacDaniels* 938 (F); Mt Mecaltepec nr Jalapa, *Pringle* 7749 (GH); nr Jalapa, *Pringle* 8105 (A, F, GH, MO, NY, US), *Schiede & Deppe* s.n. (HAL), 327 (HAL, NY), 456 (HAL), *Smith* 1546 (F), *Rose & Hough* 4279 (NY, US); Mirador, *Liebmann* 365 (F), 375A (F); Orizaba, *Botteri* 110 (GH), 248 (A, F, GH, US), *Bourgeau* 3221 (NY, US), *Mohr & Botteri* s.n. (US), s.n. (US), *Müller* s.n. (NY), 979 (NY); Zacualpan, *Purpus* s.n. (A), 287 (A), 2225 (F, GH, MO, NY, US), 10829 (US), 14156 (A), 16692 (US).

17. SAURAUIA SERRATA DC., Mém. Soc. Phys. Genève **1**: 420, 1822. (ex icon.)

Leucothea serrata Moc. & Sessé ex DC., loc. cit., nom. nud.

Davya serrata Moc. & Sessé ex DC., Prodr. **1**: 526, 1824, nom. nud.

Coriaria cuneifolia Sessé & Moc., Pl. Nov. Hisp. 173, 1890. (ex char.)

Saurauia reticulata Rose, Contr. U. S. Nat. Herb. **8**: 52, 1903. (Type: *Pringle* 7862)

S. pedunculata Hook. var. *fluviatilis* Busc., Malpighia **25**: 12, 1912, nom. subnud. (Type: *Pringle* 10122)

S. pedunculata var. *reticulata* Busc., loc. cit., nom. subnud. (Type: *Pringle* 7862)

S. pedunculata var. *strigillosa* Busc., loc. cit., nom. subnud. (Type: *Langlassé* 702)

S. pseudopringlei Busc. var. *fluviatilis* Busc., loc. cit. **28**: 380, 1919 (Type: *Pringle* 10122)

S. fluviatilis Rose ex Busc., loc. cit. (Type: *Pringle* 10122)

S. pseudopedunculata Busc., loc. cit. 398, (Type: *Langlassé* 702)

Trees to 15 m; usually sparingly pubescent. *Leaf* blades narrowly elliptic to obovate, acute to acuminate, the base acute to obtuse, the margins serrulate, 10-30 cm long, 4-12 cm wide, chartaceous, the secondary veins 14-26 pairs, the tertiary veins elevated, more prominent than the lesser reticulation, scattered-strigillose, rarely abundantly minutely sericeous between the veins above, scattered to sparingly minutely sericeous between the veins beneath, frequently villous-barbate in the in the axils of the veins beneath; petioles 1-4 cm long, 1-3 mm in diam., flattened to canaliculate above. *Inflorescences* 12- to 56-flowered, 6-20 cm long, 2-12 cm wide, the primary peduncle 2-10 cm long, the bracts linear to triangular, 1-10 mm long, rarely foliaceous, to 35 mm long. *Flowers* 13-24 mm broad, buds to 4-7 mm in diam, the pedicels to 3-15 mm long, rarely longer; sepals 5, 3-5 mm long, 3-5 mm wide, the inner 2 medially abundantly to sparingly shaggy-strigillose, rarely densely hirsute or sericeous, laterally glabrous, margins ciliate, the imbricate sepal abundantly to sparingly shaggy-strigillose, rarely densely hirsute or sericeous on the exterior half, glabrous, ciliate on the interior half, the outer 2 abundantly to sparingly shaggy-strigillose and stellate, rarely densely hirsute or sericeous, all glabrous, rarely subapically pubescent within; petals 5, white, rarely pinkish, oblong to obovate, 7-9 mm long, 3-5 mm wide, rarely larger, obtuse to incised at the apex; stamens 16-33, the anther 2.0-3.0 mm long, the filament 2.0-3.5 mm long; ovary 5-locular, globose, 5-sulcate, glabrous, the styles 5, obsolete to 5 mm long, the stigmas simple to capitate. *Berries* to 8-12 mm in diam, globose, 5-sulcate, glabrous.

In the water, barrancas, by streams, oak-forest, pine-forest, podocarp-forest, hills; 400-2500 m; flowering throughout the year.

Vernacular names: *Mameyito* (Oaxaca--Reko); *Nispero* (Guerrero--Hinton).

MEXICO: GUERRERO: Galeana, *Hinton* 10812 (F, GH, MO, NY, US), 14737 (GH, NY, US); Mina, *Hinton* 10700 (GH), 10748 (F, GH, MO, NY, US), 14958 (GH, NY, US); Vallecitos, *Hinton* 11342 (NY, US). JALISCO: SW of Talpa de Allende, *McVaugh* 14402 (MICH, MO); 11-12 mi S of Talpa de Allende, *McVaugh* 21413 (MICH, MO); below pass to Talpa de Allende, *McVaugh* 20316 (MICH, MO); betw Tecalitlán & San Isidro nr a lumber rd, *McVaugh* 15018 (MICH, MO). MICHOACÁN: Coahuayana, *Hinton* 16257 (MICH, NY, US); Mt La Cruz, *Storm* 1939 (US); Uruápan, *Pringle* 10122 (F, GH, MICH, MO, NY, US). MORELOS: nr Cuernavaca, *Pringle* 7862 (GH, US). NAYARIT: ca 10 rd mi E of Jalcocotán, *McVaugh* 12097 (MICH, MO); 9.5 mi W of Tepic, *McVaugh* 18972 (MICH, MO); hills back of Jalisco, *Ferris* 5974 (A, F, NY, US). OAXACA: vic of Cafetal Concordia, *Morton & Makrinius* 2415 (US); *Morton* 2460 (US); Cafetal Concordia, *Reko* 3707 (US); Juquila, *Conzatti* 4530 (US); Pochutla, *Reko* 6318 (F); Finca La Soledad, *Carlson* 2712 (F). SINALOA: Tres Hermanos, *Dehesa* 1544 (US). TEMASCALTEPEC: Nanchititla, *Hinton* 3597 (A, NY), 5322 (F, US), 7358 (GH, NY, US). WITHOUT PRECISE LOCALITY: Sierra Madre, Michoacán & Guerrero, *Langlassé* 702 (F, GH, K, US).

Throughout its broad range, *S. serrata* is influenced by neighboring or sympatric populations. In the north, it resembles *S. pedunculata*; in the middle of its range, *S. pringlei*; in the south, *S. aspera*. Thus, its leaves, which are usually nearly as glabrous as those of *S. pedunculata* above, may become abundantly sericeous. In addition, the multicellular unbranched hairs of the sepals vary considerably in both size and density.

18. SAURAUIA ANGUSTIFOLIA Turcz., Bull. Soc. Nat. Moscou **31**, Partie 1: 242, 1858.
(Type: Jürgensen 898)

S. anisopoda Turcz., loc. cit. (Type: Galeotti 4198)

S. leucocarpa Schlecht. var. *stenophylla* Busc., Malpighia **29**: 104, 1921. (Type: Seler 3103)

S. leucocarpa var. *stenophylla* f. *veranii* Busc., loc. cit. 107. (Type: Seler 3103)

S. leucocarpa var. *anisopoda* Busc., loc. cit. (Type: Galeotti 4198)

S. leucocarpa var. *angustifolia* Busc., loc. cit. 112. (Type: Jürgensen 898)

Shrubs and trees to 10 m; sparingly pubescent. *Leaf* blades narrowly elliptic to obovate, acuminate to acute, the base acute to obtuse, the margins serrulate, 9-17 cm long, 3-6 cm wide, chartaceous, the secondary veins 11-23 pairs, the tertiary veins elevated, more prominent than the lesser reticulation, scattered-strigillose to nearly glabrous between the veins above, scattered-strigillose between the veins beneath, not barbate in the axils of the secondary veins beneath; petioles 1-3 cm long, 1-2 mm in diam. *Inflorescences* 4- to 20-flowered, 4-10 cm long, 2-6 cm wide, the primary peduncle 2-5 cm long, the bracts linear to linear-triangular, 2-10 mm long. *Flowers* 14-17 mm broad, buds to 4-5 mm in diam, the pedicels 3-13 mm long; sepals 5, 3-5 mm long, 2-5 mm wide, the inner 2 medially abundantly to sparingly strigillose, laterally glabrous, ciliate, the imbricate sepal abundantly to sparingly strigillose, rarely glabrous on the exterior half, glabrous, ciliate on the interior half, the outer 2 abundantly to sparingly strigillose, rarely glabrous, all glabrous, rarely subapically pubescent within; petals 5, white, oblong to obovate, 6-7 mm long, 3-6 mm wide, obtuse to incised at the apex; stamens 17-19, the anther 1.5-2.5 mm long, the filament 1.5-2.5 mm long; ovary 5-locular, globose, 5-sulcate, glabrous, the styles 5, 3-5 mm long, the stigmas capitate. *Berries* 8-15 mm in diam, globose, 5-sulcate, glabrous.

Advanced forest, slopes, forested slopes, pine-covered canyon, pine-oak area, cloud forest; 1300-2400 m; flowering throughout the year.

MEXICO: CHIAPAS: Siltepec, *Matuda* 4073 (A, MICH, NY). OAXACA: Sierra de San Pedro Nolasco, Talea de Castro [District of Villa Alta] *Jürgensen* 898 (K). WITHOUT PRECISE LOCALITY: *Galeotti* 4198 (F, US).

GUATEMALA: ALTA VERAPAZ: nr San José, SE of Tactic, *Standley* 69628 (F); Tactic, *Türkheim* II700, Donn. Sm. Pl. Guat. 8380 (F, GH, NY, US), II723, Donn. Sm. Pl. Guat. 8395 (GH, US). CHIMALTENANGO: Actenango, *Standley* 61794 (A, F); above Las Calderas, *Standley* 60077 (A, F). EL PROGRESO: betw Calera & middle slopes of quebradas of V. Siglo, *Steyermark* 43000 (F). HUEHUETENANGO: Cerro Huitz, betw Mimanhuitz & Yulhuitz, *Steyermark* 48661 (F); San Martín, *Seler & Seler* 3103 (GH, US). JALAPA: Aguacate, *Williams* 13187 (F, GH); V. Jumay, *Steyermark* 32324 (F). QUEZALTENANGO: V. Santa María, *Steyermark* 34015 (F). ZACAPA: nr Finca Alejandria, Sierra de las Minas, *Steyermark* 29806 (F), 30035 (F).

Saurauia angustifolia is distinguished from *S. oreophila* by the complete lack of stellate hairs on the undersurface of the leaves, even in the young stages.

SERIES IV

LAEVIGATAE Busc., Malpighia **25**: 224, 1912, emend.

Barbigerae Busc., loc. cit. 223, pro parte.

a. Perianth usually 5-merous, broader than 12 mm (except the smaller, 3- to 5-carpellate *S. leucocarpa*).

b. Leaves not barbate in the axils of the secondary veins beneath, the epidermis glabrous to scattered-pubescent above and beneath; sepals densely heterotrichous without, obscuring the margins, Panama19. *S. seibertii*

- bb. Leaves conspicuously villous-barbate in the axils of the secondary veins beneath; sepals glabrous or homotrichous.
- c. Foliar veins scattered-strigose, the epidermis glabrous, pustulate, sepals glabrous; flower diam 7-12 mm, bud diam 2-4 mm. Mexico: Vera Cruz, Hidalgo, Puebla, Oaxaca, Chiapas; Honduras20. *S. leucocarpa*
- cc. Foliar veins scattered-tufted, the epidermis glabrous, epustulate; sepals glabrous to densely stellate; flower diam 15-25 mm, bud diam ca 5 mm. Mexico: Chiapas; Guatemala; El Salvador21. *S. kegeliana*
- aa. Perianth 4-merous (rarely 3- to 5-merous), 7-10 mm broad; leaves glabrous in the axils of the secondary veins beneath, the foliar veins scattered-tufted, the epidermis glabrous, pustulate; sepals densely stellate, becoming scattered-stellate to glabrous medially. Mexico: Oaxaca, Tabasco and Chiapas to South America22. *S. laevigata*

19. SAURAUIA SEIBERTII Standl., Ann. Missouri Bot. Gard. **26**: 290, 1939. (Type: Woodson, Allen & Seibert 1020)

Trees to 25 m; sparingly pubescent. Leaf blades elliptic to obovate, acute to acuminate, the base obtuse, the margins serrulate, 9-21 cm long, 3-8 cm wide, chartaceous, the secondary veins 10-18 pairs, the tertiary veins immersed, scarcely more prominent than the lesser reticulation, the veins sparingly tufted to glabrous above, abundantly to scattered-heterotrichous beneath, the epidermis scattered-tufted to glabrous above, scattered-clustered, glabrous in the axils of the secondary veins beneath; petioles 2-4 cm long, 1-2 mm in diam, flattened to canaliculate above. Inflorescences 26- to 52-flowered, rarely fewer, 13-28 cm long, 6-9 cm wide, the primary peduncle 6-15 cm long, the bracts linear to triangular, 2-8 mm long, sometimes foliaceous, to 50 mm long. Flowers 15-22 mm broad, buds to 6-7 mm in diam, the pedicels 5-20 mm long; sepals 5, 4-6 mm long, 3-6 mm wide, the inner 2 medially densely heterotrichous, laterally densely appressed-pubescent, the imbricate sepal densely heterotrichous on the exterior half, densely appressed-pubescent on the interior half, the outer 2 densely heterotrichous, all densely appressed-pubescent within; petals 5, white, oblong to obovate, 6-9 mm long, 3-8 mm, obtuse to incised at the apex; stamens 39, rarely ca 25, the anther 2.0-2.5 mm long, the filament 2.0-2.5 mm long; ovary 5-locular, globose, 5-sulcate, glabrous, the styles 5, obsolete to 4 mm long, the stigmas simple to capitate. Berries to 8 mm in diam, globose, 5-sulcate, glabrous.

Open sunlight, damp habitat, common along river, disturbed cloud forest; 1500-2300 m; flowering from May to August.

Vernacular name: *Avosatia* (Panama—G. White)

PANAMA: BOCAS DEL TORO: Robalo trail, Allen 4968 (MO). CHIRIQUÍ: along Río Caldera, Woodson et al. 1020 (A, F, K, MO, NY, US); Río Chiriquí Viejo valley, White 151 (MO), White 110 (MO); Boquete, Palo Alto, Stern et al. 1075 (MO, US).

The specimen collected by Allen in Bocas del Toro is aberrant. It lacks the many-flowered lax inflorescence so characteristic of the other specimens, but agrees with them in the foliar clustered and tufted trichomes, the smooth leaves which are nearly glabrous above and the reticulating tertiary veins.

20. SAURAUIA LEUCOCARPA Schlecht., *Linnaea* **10**: 249, 1836. (Type: *Schiede* 330)
*S. barbiger*a Hook., *Ic. Pl.* **4**: t. 331, 1841. (Type: *Galeotti* 3088)
S. pedunculata Hook. var. *pringleana* Busc., *Malpighia* **25**: 12, 1912, nom. subnud. (Type: *H. & C. Conzatti & Cancino* 2467)
S. pseudopringlei Busc., loc. cit. **28**: 378, 1919. (Type: *H. & C. Conzatti & Cancino* 2467)
*S. barbiger*a f. *veranii* Busc., loc. cit. 481, 1920. (Type: *Galeotti* 3088)
S. leucocarpa f. *veranii* Busc., loc. cit. **29**: 104, 1921. (Type: *Schiede* 330)
S. leucocarpa var. *wildemanii* Busc., loc. cit. 111. (Type: *Galeotti* 3088)

Shrubs and trees to 10 m; sparingly pubescent. *Leaf* blades obovate, acuminate, the base acute, often slightly oblique, the margins serrulate, 3-15 cm long, 2-5 cm wide, chartaceous, the secondary veins 6-12 pairs, the tertiary veins immersed, scarcely more prominent than the lesser reticulation, the veins sparingly to scattered-strigose, the epidermis pustulate, scattered-strigillose between the veins above, scattered minutely sericeous between the veins beneath, villous-barbate in the axils of the secondary veins beneath; petioles 0.5-2.0 cm long, 0.5-1.5 mm in diam. *Inflorescences* 7- to 65-flowered, 3-14 cm long, 1-5 cm wide, the primary peduncle 2-10 cm long, the bracts linear to triangular, 1-4 mm long. *Flowers* 7-12 mm broad, buds 2-4 mm in diam, the pedicels to ca 5 mm long, the sepals 5, sometimes 4 or 6, 2-3 mm long, 2-3 mm wide, glabrous, ciliate; petals 5, sometimes 4 or 6, white, obovate, 4-7 mm long, 3-4 mm wide, obtuse to incised at the apex; stamens 22-28, the anther ca 1 mm long, the filament ca 1.5 mm long; ovary 3- to 5-locular, globose, 3- to 5-sulcate, glabrous, the styles 3-5, 1-2 mm long, the stigmas simple to subcapitate. *Berries* globose, 3- to 5-sulcate, glabrous, to ca 15 mm in diam.

Moist mountain slopes, wooded ravines, wooded slopes, cloud zone, rain forest, canyon; 1300-2500 m; flowering throughout the year.

Vernacular names: *Cerbatana* (Honduras—Hagen), *Chaco* (Honduras—Molina).

MEXICO: CHIAPAS: Fenia, *Purpus* 10025 (US), 10087 (US). HIDALGO: betw Molango & Calnali, *Moore* 3002 (GH); Chiconquiaco, *Schiede* 330 (HAL, MO, NY). OAXACA: Coyula de Cuyamecalco Distrito de Cuicatlán, *Conzatti et al.* 2467 (F, NY). PUEBLA: ca 8 mi N of Teziutlán, *Manning & Manning* 53914 (GH). VERA CRUZ: Jalapa, *Galeotti* 3088 (BR, K), *Hahn s.n.* (K), *Pringle* 8201 (A, F, GH, MO, US), 9201 (GH, US); Maltrata, *Matuda* 1198 (A, F, K, MICH, MO, NY); Nogales, *Matuda* 1119 (A, MICH, MO, NY); Orizaba, *Botteri* 227 (GH), 283 (GH). WITHOUT PRECISE LOCALITY: *Galeotti* 2085 (F).

HONDURAS: EL PARAISO: S of Güinope, *Williams* 15762 (F, US). MORAZÁN: V. Guaimaca, *Molina* 3143 (F, US); Mt Uyuca, *Carlson* 2466 (F); *Molina* 921 (F, GH), *Molina* 10678 (US), *Williams & Molina* 12619 (F). SIGUATEPÉQUE: above El Achote, *Yuncker et al.* 6159 (F, GH). TEGUCIGALPA: Montana de la Flor, *von Hagen & von Hagen* 1293 (F, NY).

Saurauia willdemanii (see previous discussion of *S. pringlei*) was based on a Galeotti collection from Juquila, Oaxaca with the same number, 3088, as the Jalapa, Vera Cruz collection. Buscalioni recognized the Hooker name, as well as two distinct varieties of *S. leucocarpa*, all based on Galeotti's Jalapa collection.

Its small flowers with completely glabrous sepals make *S. leucocarpa* one of the easiest species to identify.

21. SAURAUIA KEGELIANA Schlecht., *Bot. Zeit.* **11**: 694, 1853. (ex char.)

S. pauciserrata Hemsl., *Diagn. Pl. Nov.* 3, 1878. (Type: *Salvin s.n.*)

S. maxoni Donn. Sm., *Bot. Gaz.* **42**: 292, 1906. (Type: *Maxon & Harvey* 3221)

- S. pauciserrata* var. *kegeliana* (Schlecht.) Busc., *Malpighia* **25**: 13, 1912, nom. subnud. (Type: *Heyde & Lux* 4328)
S. pauciserrata f. *kegeliana* (Schlecht.) Busc., loc. cit. **29**: 7, 1921. (Type: *Heyde & Lux* 4328)
S. pauciserrata f. *crenata* Busc., loc. cit. 11. (Type: *Bernoulli & Cario* 3347)
S. pauciserrata f. *veranii* Busc., loc. cit. 22, nom. nud. (Type: *Salvin s.n.*)
S. intermedia Busc., loc. cit. 23. (Type: *Skinner s.n.*)

Shrubs and trees to 3-8 m; sparingly pubescent. *Leaf* blades obovate to narrowly elliptic, acuminate, the base subattenuate to acute, the margins crenulate or serrate to serrulate, 8-20 cm long, 2-8 cm wide, membranaceous to subcoriaceous, the secondary veins 7-11 pairs, the tertiary veins immersed, scarcely more prominent than the lesser reticulation, the veins scattered-tufted, the epidermis epustulate, glabrous except the villous-barbate axils of the secondary veins beneath; petioles 2-5 cm long, 1-2 mm in diam. *Inflorescences* 3- to 30-flowered, 5-16 cm long, 3-7 cm wide, the primary peduncle 2-11 cm long, scattered-tufted, the bracts linear to foliaceous, 1-25 mm long. *Flowers* 15-25 mm broad, buds to 4-5 mm in diam, the pedicels 3-25 mm long, abundantly to densely tufted, clustered and shaggy; sepals 5, margins ciliate, surfaces glabrous to densely appressed-stellate laterally without and within; petals 5, white, oblong to obovate, 6-14 mm long, 4-9 mm wide, obtuse to incised at the apex; stamens 24-28, the anther 2-3 mm long, the filament 2-4 mm long; ovary 5-locular, globose, 5-sulcate, glabrous, the styles 5, obsolete to 4 mm long, the stigmas subcapitate. *Berries* ca 10 mm in diam, globose, 5-sulcate, glabrous.

Dark forest, moist forest, wet mixed forest, second growth woods, opening in forest, wet thicket, brushy slope, south facing slopes, barranca, cleared area, along road; 550-3000 m; flowering from October to April.

Vernacular names: *Hoja de Nispero* (Guatemala—Aguilar), *Moquilla* (Guatemala—Standley); *Alais* (El Salvador—Padilla), *Capulín* (El Salvador—Carlson), *Capulín de Montaña* (El Salvador—Calderon), *Capulín Montes*, *Cerezo*, *Cresta de Gallo* (El Salvador—Standley).

MEXICO: CHIAPAS: Escuintla, *Matuda* 16191 (F, NY); Mt Ovando, *Matuda* 0482 (MICH, MO, US), 0575 (MICH, MO, US), 2654 (A, F, K, MICH, NY, US); Siltepec, *Matuda* 5106 (F); V. Tacana, *Matuda* 2975 (A, F, K, MICH, MO, NY).

GUATEMALA: ALTA VERAPAZ: vic of Secanquim, *Maxon & Harvey* 3221 (US). AMATITLÁN: San Vicente Tadayá, *Tonduz* 443 (US). BAJA VERAPAZ: nr San Geronimo, *Kellerman* 6631 (F). CHIMALTENANGO: V. Acatenango, *Kellerman* 6601 (F, US); Panajabal, *Standley* 62130 (NY). GUATEMALA: Palencia, *Morales* 938 (US); nr Finca La Aurora, *Aguilar* 270 (F). QUEZALTENANGO: N of Colomba, *Holway* 820 (US); ca 25 mi above Mazatenango on road to Quezaltenango, *Bunting* 361 (MO); Palmar, *Skutch* 1455 (A, NY, US); along Río Samalá, nr Santa María de Jesús, *Standley* 84670 (US). SACATEPÉQUEZ: V. Acatenango, *Kellerman* 4825 (F, US); V. Agua, *Standley* 59508 (NY); above Dueñas, *Standley* 63151 (A, NY, US); V. Fuego, *Salvin s.n.* (K), *Smith* 1453 (GH, US). SAN MARCOS: betw Todos Santos & Finca El Porvenir, *Steyermark* 37047 (F); betw Finca El Porvenir to "Numero 6" lower S-facing slopes of V. Tajumulco, *Steyermark* 37141a (F); above San Rafael Pié de la Cuesta, *Standley* 68660 (F). SANTA ANA: NW flank of V. Santa Ana, *Tucker* 1234 (NY, US). SANTA ROSA: nr El Molino, *Standley* 60726 (F); El Teocinte, *Heyde & Lux* 4328 (F, GH, NY, US). WITHOUT PRECISE LOCALITY: Barranca de Pinula, *Skinner s.n.* (K) *Bernoulli* 266 (K), 285 (K); *Bernoulli & Cario* 3347 (K); *Heyde* 580 (US).

EL SALVADOR: AHUACHUAPÁN: Sierra de Apaneca, region of Finca Colima, *Standley* 20065 (US); *Padilla* 275 (US). LIBERTAD: Comasagua, *Calderón* 1385 (GH, US); nr Comasagua, *Carlson* 222 (F); nr Tecla, *Carlson* 73 (A, US), *Standley* 23069 (GH, US).

SANTA ANA: on Cerro de Los Naranjos, V. Santa Ana, *Williams et al.* 15153 (F). SAN VICENTE: V. San Vicente, *Standley* 21563 (GH, US). SONSONATE: San Juan de Dios, *Pittier* 2002 (GH, US). WITHOUT PRECISE LOCALITY: V. San Salvador, *Calderón* 447 (GH, US), *Standley* 22933 (GH, NY, US).

The sepals of *S. kegeliana* show a clinal increase in the density of the pubescence of the sepals, from glabrous in the El Salvador collections to densely pubescent in the Mexican specimens. Sterile specimens are distinguished from *S. laevigata* by the villous-barbate axils of the secondary veins on the underside of the leaves and by the epustulate foliar epidermis.

22. SAURAUIA LAEVIGATA Triana & Planch., *Ann. Sci. Nat., Sér. 4, Bot.*, **18**: 267, 1862. (Type: *Triana s.n.*)

S. yasicae Loes., *Bot. Jahrb.* **23**: 125, 1896. (Type: *Rothschuh* 246)

S. herbert-smithii Rusby, *Descr. new sp. S. Amer. pl.* 57, 1920. (Type: *H. H. Smith* 857)

S. leucocarpa Schlecht. var. *smithiana* Busc., *Malpighia* **29**: 232, 1922. (Type: *Türckheim* 1445)

S. yasicae var. *laevigata* Busc., loc. cit. (Type: *Tonduz* 11453, *Donn. Sm. Pl. Guat.* 7320)

S. yasicae var. *laevigata* f. *veranii* Busc., loc. cit. 413, 1923. (Type: *Tonduz* 13147)

S. smithiana Busc., loc. cit. 445. (Type: *H. H. Smith* 857)

S. pseudopittieri Busc., loc. cit. **30**: 97, 1927. (Type: *Pittier* 11247, *Donn. Sm. Pl. Guat.* 7318)

S. zetekiana Standl., *Jour. Arnold Arb.* **11**: 124, 1930. (Type: *Bangham* 578)

S. belizensis Lundell, *Field & Lab.* **13**: 7, 1945. (Type: *Gentle* 4439)

Trees to 30 m; sparingly pubescent. Leaf blades obovate to elliptic, obtuse to acuminate, the base subattenuate to obtuse, sometimes oblique, the margins serrulate to serrate, 6-22 cm long, 2-10 cm wide, membranaceous to chartaceous, the secondary veins 7-14, rarely 18 pairs, the tertiary veins immersed, scarcely more prominent than the lesser reticulation, the veins scattered-tufted, the epidermis pustulate, glabrous, not barbate in the axils of the secondary veins beneath; petioles 0.5-3.0 cm long, 0.5-2.5 mm in diam. Inflorescences 40- to more than 150-flowered 5-20 cm long, 2-10 cm wide, the primary peduncles 2-10 cm long, the bracts triangular to linear or foliaceous 1-35 mm long. Flowers 7-10 mm broad, buds 1-3 mm in diam, the pedicels to 1-6 mm long; sepals 4, rarely 3 or 5, 2-3 mm long, 2-3 mm wide, densely stellate laterally, becoming scattered-stellate to glabrous medially; petals 4, rarely 3 or 5, white, oblong to obovate, 4-5 mm long, 2-4 mm wide, obtuse to incised at the apex; stamens 20-30, the anther 1.0-1.5 mm long, the filament 1.5-2.5 mm long; ovary 4-, rarely 3- to 5-locular, globose, 4-, rarely 3- or 5-sulcate, glabrous, the styles 4, rarely 3 or 5, to 1 mm long at anthesis, the stigmas simple. Berries to 8 mm in diam, globose, 4-, rarely 3- or 5-sulcate, glabrous.

Virgin forest, deep forest, in coffee plantation with original forest trees, advanced forest, wooded valley, thicket along stream, stream bank, near river, slopes, in shade, hills, high ridge, edge of barranca; 30-1300 m; flowering throughout the year.

Vernacular names; *Jahoncillo*, *Wild Orange* (British Honduras—Gentle); *Chulindron* (Honduras—von Hagen).

MEXICO: CHIAPAS: Motozintla, *Matuda* 16417 (NY); Mt Ovando, *Matuda* 4171 (A, MO, MICH, NY); Palenque, *Matuda* 3700 (A, MO, NY); Vieja, *Matuda* 2526 (A, K, MICH,

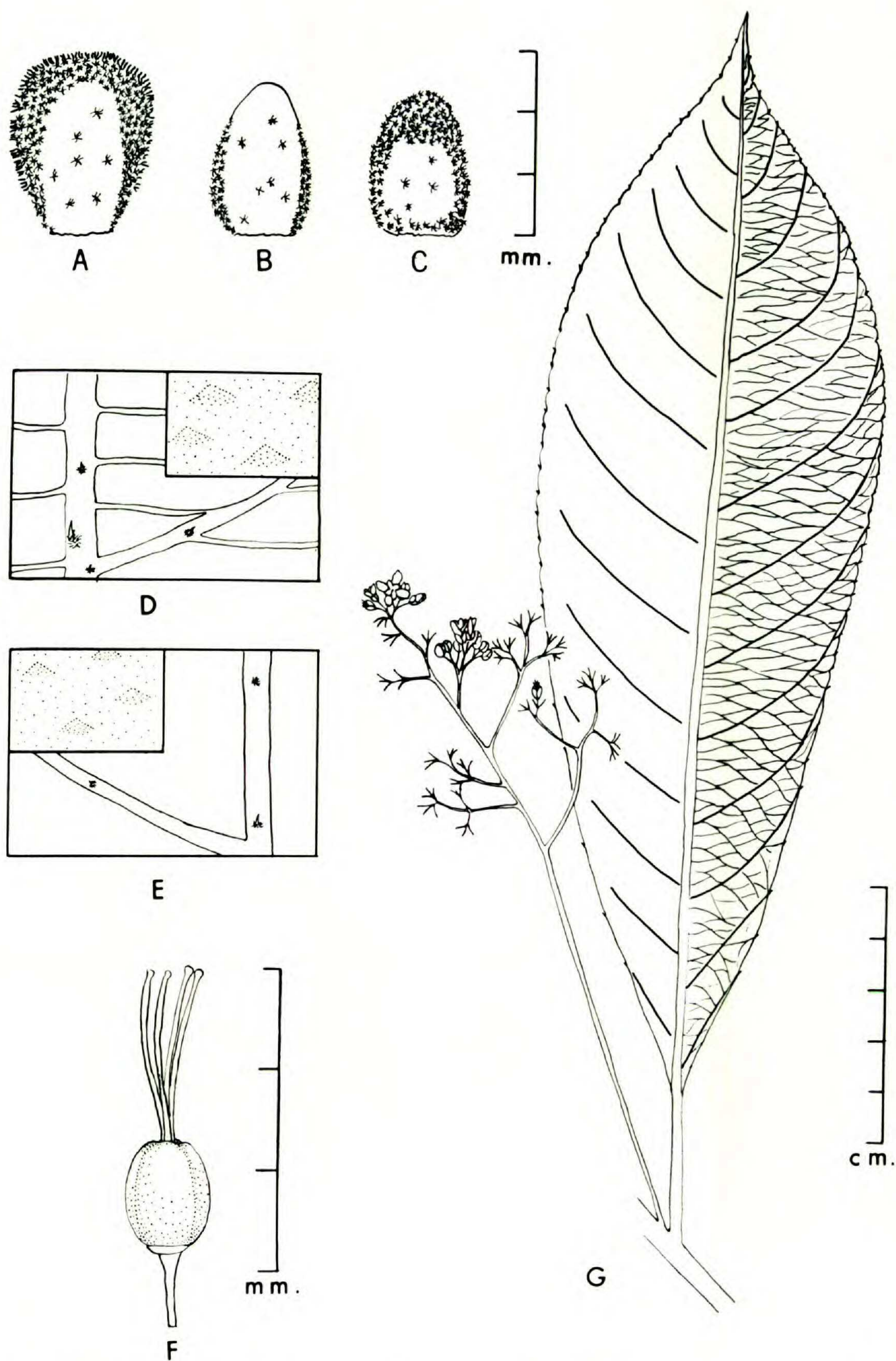


Fig. 5. *S. laevigata*. A. Inner sepal, outer surface; B. Outer sepal, outer surface; C. Outer sepal, inner surface; D. Lower leaf surface (inset—pustulate epidermis); E. Upper leaf surface (inset—pustulate epidermis); F. Ovary; G. Leaf and inflorescence.

NY). OAXACA: Santo Domingo, *Nelson* 2672 (GH, US). TABASCO: Tenosique, *Matuda* 3453 (A, MO, NY), 3555 (A, NY).

BRITISH HONDURAS: CAYO: El Cayo, Chalillo crossing, *Lundell* 6519 (F, NY); Valentin, *Lundell* 6185 (F, NY, US). STANN CREEK: Humming Bird Hwy, *Gentle* 8254 (US), 8907 (US); Middlesex, *Gentle* 2776 (A, F, NY, US), 2910 (A, F, MICH, NY), 2930 (A, F, NY), 3035 (A, F, MO, NY), *Schipp* 236 (A, F, GH, MO, NY, US); Stann Creek Railway, *Gentle* 2112 (A, F, MO, NY, US); Stann Creek Valley, *Stevenson* 13 (US); Stann Creek Valley, Big Eddy Ridge, *Gentle* 3352 (A, F, NY, US). TOLEDO: Punta Gorda, *Schipp* 1003 (A, F, MO, NY).

GUATEMALA: ALTA VERAPAZ: Cobán, *H. Johnson* 519 (US); Pansamalá, *Türckheim* 1445 (GH, NY, US); Sacolol, *Türckheim* III892 (F, US). PETÉN: N of El Cambio, *Steyermark* 45977 (F, US). QUEZALTENANGO: Colomba, *Skutch* 1335 (A, F, NY, US), 1364 (A, F, US), 1987 (A, F, NY, US). RETALHULEU: San Felipe, *Smith* 1493 (GH, NY, US); E of Santa Cruz Muluá, *Standley* 88242 (F). SUCHITEPEQUEZ: Río Sis, *Smith* 1494 (US).

HONDURAS: ATLÁNTIDA: vic of La Ceiba, *Yuncker et al.* 8530 (F, GH, MO, NY, US), 8717 (F, GH, MO, NY, US), 8837 (F, GH, MO, NY, US); Lancetilla, *Yuncker* 4628 (MO); Tela, *Bangham* 241 (A, F, US); nr Tela, *Standley* 53094 (A, F, US). CORTÉS: *Molina* 5530 (F), 5666 (F); Montaña de Río Piedra, *Molina* 3564 (F, US); nr Lake Yojoa, *Williams & Molina* 14563 (F). SANTA BARBARA: Sauce, *Williams & Molina* 14522 (F, GH, MO). YORO: Subirana, *von Hagen & von Hagen* 1101 (F, NY).

NICARAGUA: MATAGALPA: Cañada, *Yasica, Rothschuh* 246 (US).

COSTA RICA: ALAJUELA: San Ramon, *Brenes* 19243 (NY). CARTAGO: Tuis, *Pittier* 11247, *Donn. Sm. Pl. Guat.* 7318 (US), *Tonduz* 8109 (US), 11452 (US), 11453, *Donn. Sm. Pl. Guat.* 7320 (GH, US); Turrialba, *Pittier* 11242 (US). LIMÓN: Guácimo, *Tonduz* 14892 (K). PUNTARENAS: vic of Esquinas, *Allen* 5699 (F, US); betw Golfo Dulce & Río Térraba, *Skutch* 5386 (US). TILARÁN: Arenal, *Valerio* 3 (US). WITHOUT PRECISE LOCALITY: Las Vueltas, Tucurrique, *Tonduz* 13147 (F, US); San Pedro de la Calabaza, *Cooper* 10846 (US); Santa Clara, *Cooper* 10240 (US).

PANAMA: CANAL ZONE: Barro Colorado Island, *Bangham* 578 (A, F). *Salvoza* 998 (A). COCLÉ: El Valle de Antón, *Allen* 3630 (MO, NY, US); *Seibert* 429 (A, F, NY); N of El Valle, *Allen* 2180 (GH, MO, US); betw Las Margaritas & El Valle, *Woodson et al.* 1733 (MO, NY); trail to Las Minas, N of El Valle de Antón, *Allen* 2464 (F, MO, NY, US), 3706 (MO); N rim of El Valle, *Allen* 1895 (GH, MO, NY, US). PANAMÁ: Cerro Azul, *Dwyer* 2051 (MO).

COLOMBIA: CUNDINAMARCA: NW of Bogotá, Charco, *Little* 7370 (US). MAGDALENA: Santa Marta, *Smith* 857 (MO, US), 1774 (MO, P, US). TOLIMA: Libano, *Pennell* 3306 (US).

Saurauia laevigata is the only species occurring in North America which is known to occur also in South America. With its glabrous foliar epidermis and small tetramerous flowers, it is the most easily identified of all the American species of *Saurauia*. Buscalioni (1922-1927), who recognized seven different names for this population, never realized the taxonomic significance of the tetramery of the flower. *Saurauia pseudopittieri* was based on a plant which I believe is a hybrid between *S. laevigata* and *S. pittieri*. It is cited here, primarily because of the predominant tetramery of its flowers and the characteristic venation and pubescence of its leaves.

IMPERFECTLY KNOWN TAXA OF SAURAUIA

1. *S. behnickiana* Busc., *Malpighia* **30**: 360, 1927.

This species was described from inadequate material as a dubious species. I have not seen the type.

2. *S. conzattii* Busc. var. *arthuriana* Busc., *Malpighia* **30**: 430, 1927.

I have not seen the type and am unable to make a decision from Buscalioni's brief description.

3. *S. costaricensis* Donn. Sm. var. *scabrida* Busc., *Malpighia* **30**: 240, 1927.

This variety was proposed as a dubious taxon. I have not seen the type.

4. *S. dubia* Busc., *Malpighia* **30**: 229, 1927.

As the name implies, this was published as a dubious species. I have not seen the type.

5. *S. radlkoferi* Busc., *Malpighia* **27**: 6, 1916.

I have not seen the type specimen on which this species was based; however, a photograph of the type specimen, published by Buscalioni in *Malpighia*, leads me to suspect that it is synonymous with *S. oreophila*.

6. *S. villora* var. *straussiana* Busc., *Malpighia* **30**: 348, 1927.

"Villora" is obviously a misprint of "villosa." This, too, was published as a dubious taxon. I have not seen the type.

LITERATURE CITED

- BROWN, E. G. S. 1935. The floral mechanism of *Saurauia subspinosa*. *Anth. Trans. & Proc. Bot. Soc. Edinburgh* **31**: 485-497.
- BUSCALIONI, L., & G. MUSCATELLO. 1912-1927. Studio monographico sulle specie Americane del gen. *Saurauia* Willd. *Malpighia* **24**: 381-412; **25**: 1-16, 105-118, 187-250, 389-436; **26**: 1-32, 97-144, 281-312, 389-420; **27**: 1-32, 131-158, 293-324, 487-502; **28**: 1-48, 107-138, 223-238, 315-330, 371-402, 473-448; **29**: 1-32, 97-112, 230-246, 319-366, 411-458; **30**: 35-444.
- CHANDLER, M. E. J. 1925. The upper Eocene flora of Hordle, Hants. *Monog. Palaeog. Soc. Lond.*
- CORNER, E. J. H. 1925. Centrifugal stamens. *Jour. Arnold Arb.* **27**: 423-437.
- DIELS, L. 1922. Die Dilleniaceen von Papuasien. *Engl. Bot. Jahrb.* **57**: 441-459.
- ERDTMAN, G. 1952. Pollen morphology and plant taxonomy. *Angiosperms*. Almqvist & Wiksell, Stockholm.
- GILG, E. 1893. *Dilleniaceae—Actinidioidae und Saurauioideae*, In ENGLER & PRANTL, *Natürl. Pflanzenfam.* III. **6**: 125-128.
- , & E. WERDERMANN. 1925. *Actinidiaceae*, In ENGLER & PRANTL, *Natürl. Pflanzenfam.*, ed. 2, **21**: 36-47.
- HOLLICK, A. 1936. The Tertiary floras of Alaska. *U. S. Geol. Surv. Prof. Paper* 182.
- LANJOUW, J., ET AL. 1961. *International Code of Botanical Nomenclature. (Regnum vegetabile 23)*
- LANGERON, M. 1900. Contribution a l'étude de la flore fossile de Sezanne. *Soc. Hist. Nat. Autun Bull.* **13**: 333-370.
- LECHNER, S. 1915. Anatomische Untersuchungen über die Gattungen *Actinidia*, *Saurauia*, *Clethra*, und *Clematoclethra* mit besonderer Berücksichtigung ihrer Stellung im System. *Beih. Bot. Centralbl.* **32**(Abt. 1): 431-467.
- MACBRIDE, J. F. 1956. Flora of Peru (*Actinidiaceae*). *Field Mus. Publ. Bot.* **13** (Part 3A): 677-686.
- MATTHEWS, J. R., & G. TAYLOR. 1927. The structure and development of the stamen in *Erica hirtiflora*. *Trans. & Proc. Bot. Soc. Edinburgh* **29**: 235-242.
- SCHNARF, K. 1924. Bemerkung zur Stellung der Gattung *Saurauia* im System. *Sitzber. Akad. Wiss. Wien, Abt. I.* **133**: 17-28.
- SMITH, A. C. 1941. Studies of Papuan plants, IV. *Jour. Arnold Arb.* **22**: 497-528.
- STANDLEY, P. C., & J. A. STEYERMARK. 1947. Studies of Central American plants, VII. *Field Mus. Publ. Bot.* **23**: 193-266.
- . 1949. Flora of Guatemala (*Saurauiaceae*). *Fieldiana Bot.* **24**(6): 428-438.
- THOMAS, J. L. 1961. The genera of the *Cyrillaceae* and *Clethraceae* of the southeastern United States. *Jour. Arnold Arb.* **42**: 96-106.

ENUMERATION OF SERIES AND SPECIES OF SAURAUIA

- | | |
|---|---|
| <p>I. SERIES GYMNOGYNAE</p> <p>1. <i>villosa</i> DC.</p> <p>2. <i>pittieri</i> Donn. Sm.</p> <p>3. <i>rubiformis</i> Vatke</p> <p>4. <i>comitis-rossei</i> Schultes</p> <p>5. <i>pustulata</i> G. E. Hunter</p> <p>II. SERIES GYNOTRICHAE</p> <p>6. <i>veraguasensis</i> Seem.</p> <p>7. <i>squamifruca</i> G. E. Hunter</p> <p>8. <i>waldheimia</i> Busc.</p> <p>III. SERIES OREOPHILAE</p> <p>9. <i>scabrida</i> Hemsl.</p> <p>10. <i>pringlei</i> Rose</p> | <p>11. <i>oreophila</i> Hemsl.</p> <p>12. <i>zahlbruckneri</i> Busc.</p> <p>13. <i>aspera</i> Turcz.</p> <p>14. <i>selerorum</i> Busc.</p> <p>15. <i>conzattii</i> Busc.</p> <p>16. <i>pedunculata</i> Hook.</p> <p>17. <i>serrata</i> DC.</p> <p>18. <i>angustifolia</i> Turcz.</p> <p>IV. SERIES LAEVIGATAE</p> <p>19. <i>seibertii</i> Standl.</p> <p>20. <i>leucocarpa</i> Schlecht.</p> <p>21. <i>kegeliana</i> Schlecht.</p> <p>22. <i>laevigata</i> Triana & Planch.</p> |
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